

PERSONAL COMPUTER

EVERY THURSDAY

50p

NOV 24-30 1983 Vol 1 No 38

NEWS

THE COMPLETE COMPUTING WEEKLY

THIS WEEK

DRAGON SCRAMBLE
Arcade action in an
all m/c listing

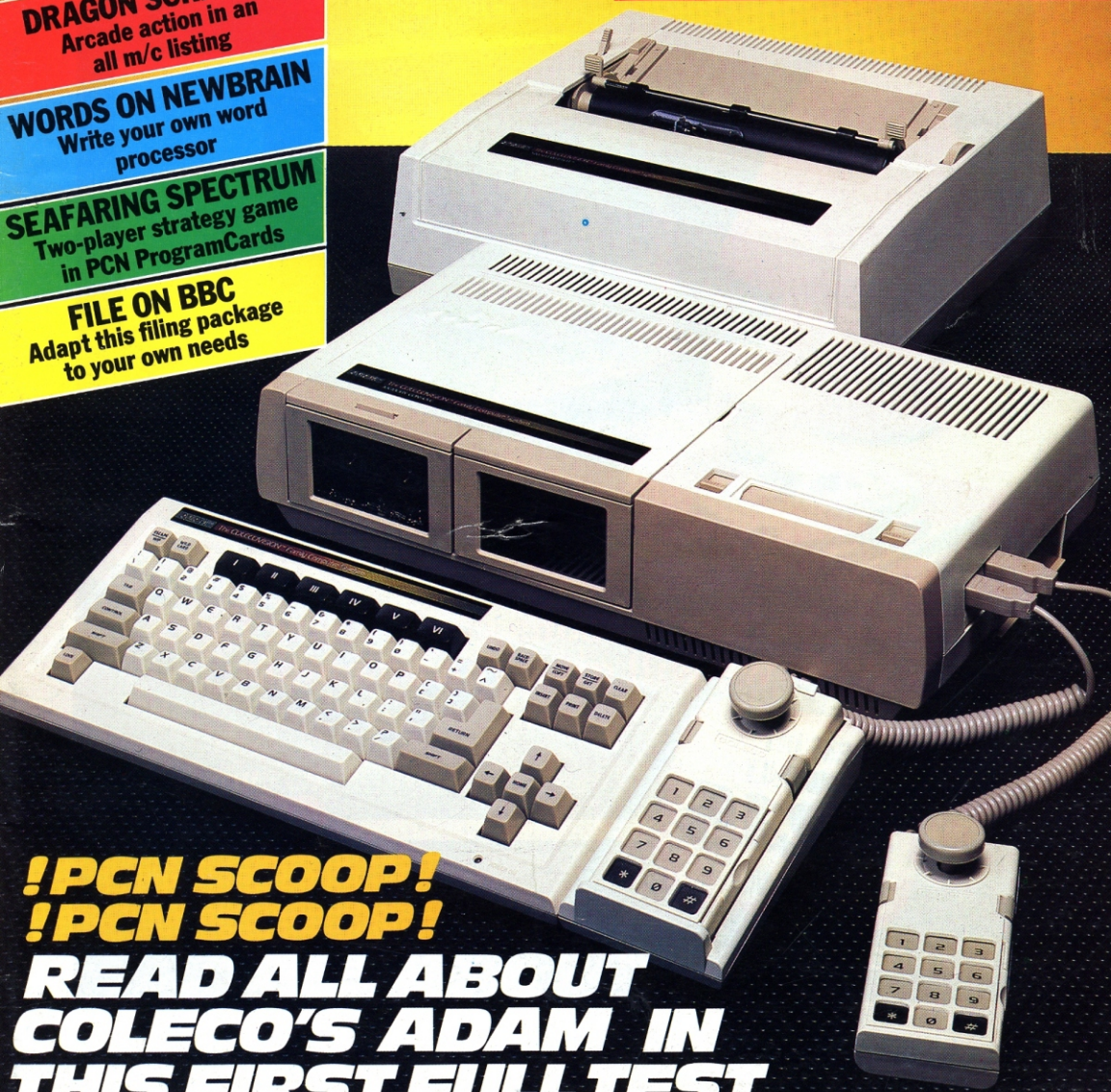
WORDS ON NEWBRAIN
Write your own word
processor

SEAFARING SPECTRUM
Two-player strategy game
in PCN ProgramCards

FILE ON BBC
Adapt this filing package
to your own needs

PULL-OUT MICROPAEDIA

Your complete guide to monitors



**!PCN SCOOP!
!PCN SCOOP!**

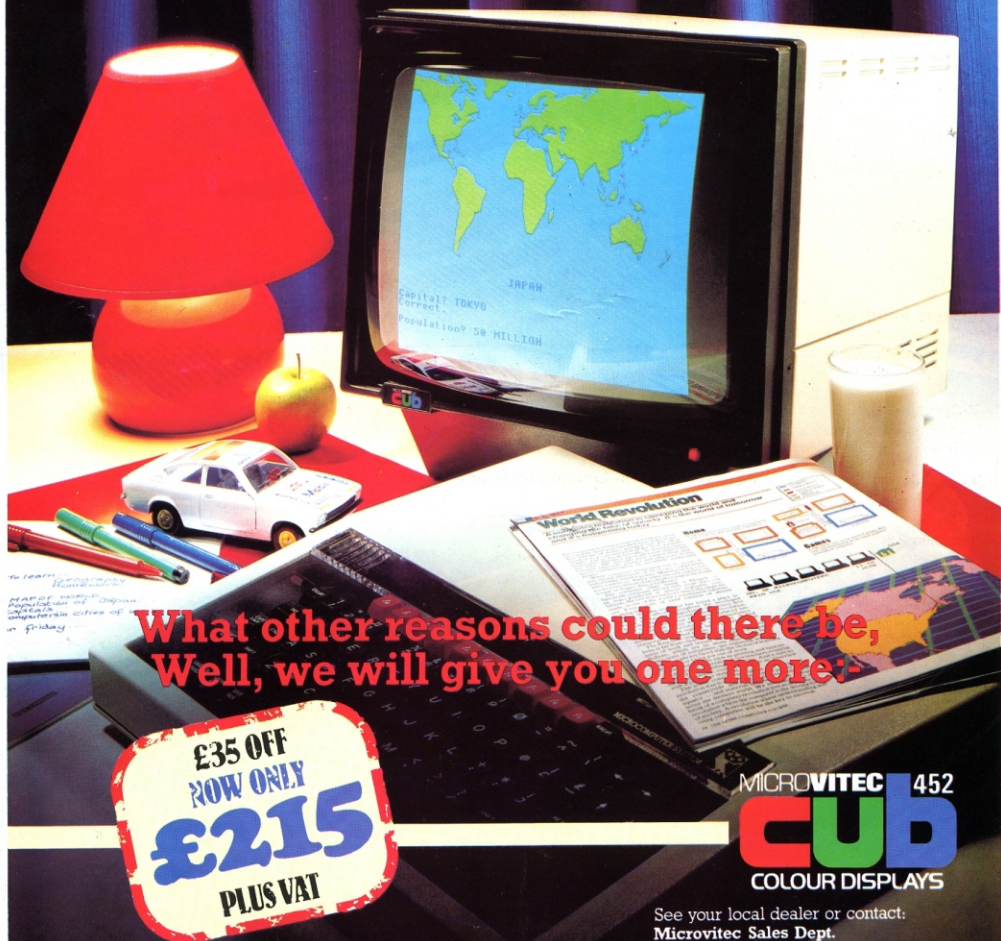
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of 20 free Spectrums
See page 44



**Pull-out and keep
Micropaedia**

Your guide to monitors: which ones work with your machine, how to measure the specifications, why you should think about buying one.

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Cover photo by Andy Willis.

Spectrum contest revisited

Many apologies to all of you who searched in vain through last week's PCN to find the entry form for our Spectrum Micropaedia competition. A production mix-up caused its non-appearance, but in this issue you will definitely find it on page 44. To compensate for this delay we've doubled your chances of winning by offering an extra 10 prize Spectrums, so there are now 20 to be won. We've also extended the closing date to December 15.

PCN PRO-TEST: HARDWARE



The first Adam 20

A micro offering built-in high speed storage, printer, 80K of RAM and word processing software as well sounds too good to be true. But that's what Coleco's Adam promises. Brian Power gets his hands on one.

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Until software support for the recently rescued Newbrain gets cranked up, how about a free word processor? Chris Rust presents a complete program.

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Data filing is one of the most useful applications for a home micro, and Simon Williams finds a package for the Model B that might handle most smaller applications.

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Acorn reveals price shock

By Kenn Garroch

One possible reason for the delayed appearance of the legendary BBC second processors has emerged — to give you time to save up for them.

Acorn staff revealed last week that the 6502 add-on will cost between £300 and £400 when it appears. But the Z80 second processor will come out of the traps at a staggering £800 or £900.

The fabled processors both made an appearance at Compec last week and the Crown Jewels would hardly have attracted more attention. The promise of additional processors has been on the tip of Acorn's tongue since the launch of the BBC, but like the Loch Ness monster reliable sightings have been few and far between.

The 6502 is now expected to become available in spring next year. It will come with 64K of RAM, 16K of which will be occupied by Basic if you are using it. The Z80, four or five months after the 6502, will be supplied with some CPM-based software packages, indicating that it will be intended for business rather than for home users.

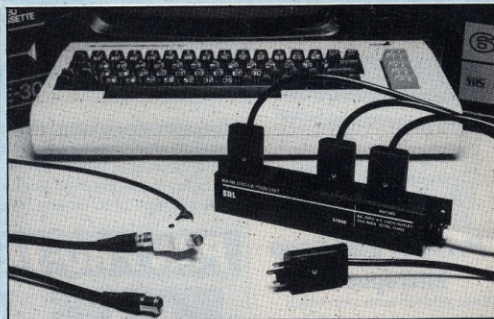
The BBC's contract with Acorn

comes up for renewal in autumn 1984, and Sinclair is known to be interested in bidding against Acorn. The second processor shambles should give Sir Clive the ammunition he needs, particularly now that Sinclair has the Microdrive and other launches successfully behind it.

Sinclair challenged for the original contract to supply the BBC with a micro worthy of its name but was beaten out by Acorn. Since then, the BBC micro has underwritten Acorn's success with sales estimated at £200,000.

■ A chip shortage is apparently responsible for the scarcity of Electrons. Acorn said last week that certain chips were in short supply (without specifying which) but it also admitted that demand for the new machine had exceeded estimates. There were some Electrons on show at Compec, but none was for sale.

WH Smith caused short-lived excitement when it claimed to have stocks of Electrons for its new store at London's Heathrow airport, but it later confessed that its supplies of Electrons were irregular and unpredictable.



SPAGHETTI JUNCTION — Electro Replacement wants to help you with the piles of spaghetti pouring out of the back of your home micro. It won't totally solve the problem, merely reduce it to a manageable size. Its ERL multiplexer is a compact, four-way mains distribution box that can be either screwed to the wall or, ERL suggests more hazardously, to the back of a television monitor. The box costs £7.95 from electrical, hi-fi and computer shops. Also on offer is a two-way coaxial adaptor that saves you the hassle of unplugging the TV aerial every time you want to use your micro. It costs £1.50.

BBC toolbox sorted out

The BBC has acted on a PCN review to document faults in its Toolbox suite of programs.

The problems were revealed in Issue 37. PCN's reviewer found that it was possible to corrupt an entire disk simply by pressing Break, and he lost a word processing package in

this way. He also noted that the command to turn on the printer had, in the BBC's words, 'been accidentally omitted from the setup routine in the object code' of the graphics dump routine.

BBC Publications now says that it is aware of the problems and that it has produced a technical note which is available to users from: The Software Assistant, BBC Publications, 35 Marylebone High St, London W1M 4AA.

Copylock repels pirates

Uncrackable software may well have arrived at last. Copylock, produced by Export Software International (031-556 3266) reduces the pirates' chances of breaking into a protected disk to around one in several thousand million.

Mathematically it's not uncrackable, but the software's liable to have been superseded and the machine consigned to the Science Museum before you've done it.

Copylock operates using a fingerprint and encryption. A fingerprint is normally a small piece of metal on the disk which uses a code. This must be unlocked in order to read

the disk. Copylock's fingerprint, however, is invisible, and the code is considerably more complex than previous efforts. It also has the advantage that it doesn't take up any space on the data area.

You can make backup copies of your fingerprinted master disk, but you can't read them without a master disk. So if you damage your master, you have to exchange it for a replacement master before you can read the backup.

Copylock is currently in use on Export Software's own CP/M-86 Toolbox and Expert-Ease. It costs £6.50 a disk for up to 50 disks.

Jupiter to move back into orbit?

By Ralph Bancroft

The stricken Jupiter Ace (Issue 35) may be given a new lease of life before Christmas following the creditors' meeting earlier this month.

The creditors appointed Dennis Cross of accountants Chater and Myhill to act as liquidator of Jupiter Cantab, which had run up total debts of £140,000. Mr Cross is currently looking for would-be purchasers of the company and has already had several inquiries.

'Most of them are for parts of the

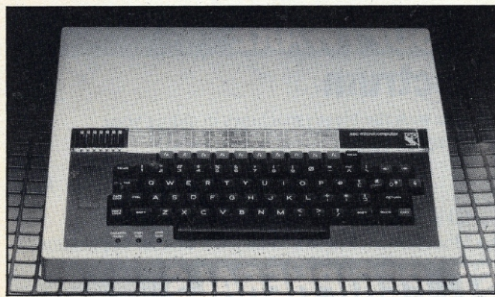
company,' Mr Cross said, 'but there are a few people who are interested in buying the whole company.'

He stressed that his job as liquidator is to sell the assets of the company, which includes a stock of 1,600 Aces, to pay off the creditors. Any buyer of the company would not be taking on the £140,000 debt.

The inquiries have come from companies already in the micro business. 'Most of them are interested in widening their product range,' said Mr Cross. He would not however say who the companies are. 'I don't want to prejudice the outcome of my negotiations,' he said.

Although still open to offers, Mr Cross said that he hoped to finalise the sale soon.

Chater and Myhill is on 0223-66692.



The BBC micro — another few months in solitary for its processor.

Midas touch

A new micro from Sirton (01-640 6931) holds out the promise of trouble-free running in the most hostile of environments.

The Midas 2D/TE is a Z80/64K RAM/twin floppy machine that is designed to cope with high temperatures, dusty environments and wildly fluctuating or non-existent mains supplies.

The micro has not one but two internal cooling fans. One keeps the main circuit board cool and the other deals with the disk drives. The temperature-tolerant components are evenly spaced throughout the unit to keep heat dissipation at the optimum level.

Two large dust filters are mounted externally and can be easily removed for servicing.

The micro works with a battery back up that switches in if the mains power fails or fluctuates beyond acceptable limits. Sirton claims that the switching is so instantaneous that even disk operations won't be affected. You can carry on writing to disk even in a power cut without fear of corrupted data.

Reflecting the micro's go-anywhere image, it will work off ordinary car or truck batteries.



Sirton's go-anywhere Midas 2D/TE.

Computers feels the CP/M strain

The £445 Computers Lynx 128K is with us at last — in spirit.

Computers was showing the beast at Compec and promising its appearance in the shops in the next few weeks. But the CP/M system, though running after a fashion on the company's stand, wasn't quite ready yet.

In the Hostage to fortune department, Computers' current brochure claims 'the key feature of the 128K Lynx is that it runs CP/M

The version of CP/M on show still had a few teething troubles, including a nasty screen judder when you asked it for a directory. Computers says this should all be cured in the next few weeks, but this puts the store-launch of the complete Lynx 128K, CP/M and disk drive system perilously close to Christmas.

The CP/M system itself is only likely to run on the 128K version, and as it was originally intended that CP/M would be given free with the machine, it's possible that this could hold up distribution of the expanded Lynx.

The idea of distributing it free with the disk drives is being considered, but this will be almost pointless if you're using the drives with the 96K machine. Upgrades, however, are currently planned for the difference in cost between the machines plus carriage.

Jonos joins the heavyweights

A armour-plated IBM workalike? If you're doing a really big outdoor job and you need a lot of power on site, then this one may be for you.

Jonos International (Windsor 54272) was showing a range of chunky portables, from the Jonos 2100 with dual 3.5in Sony drives (2,424) through to the £4,295 2600, which sports a single 10Mb Remcon on top of its Sonys.

In between these you can get varying configurations of assorted Winchester and floppies.

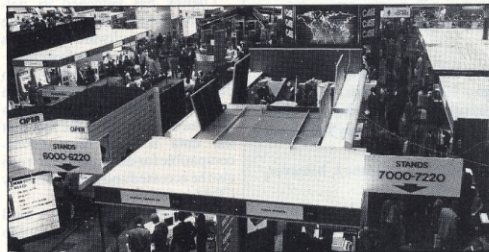
The basic machine is around the size of a Hyperion.

The display machines were mounted on vibrating stands to show how they worked in inclement conditions. Staff seemed prone to switching the vibration on without warning, provoking comments on the lines of, 'strewth, drives run a bit rough, don't they?'



Solid power — the Jonos with hard disks.

Compec compiled



Drives link up in Perfect range

Perfect Software has added to its range with Perfect Link, an advanced communications program mainly for the IBM PC or compatible computers.

The software is completely menu driven, even down to specifying baud rates. One of its main features is the ability to read and write disks from any of a set of specified machines. Perfect says that it will be increasing the number of compatible machines at a later date. At the moment the software can cope with most of the major IBM lookalikes, running CP/M and MSDOS.

Other facilities include automatic setting up in which the computer remembers previously defined settings. File transfer via X-Modem protocols, terminal emulation, flexible file storage, automatic dialing, and on-screen time display are among its other attractions. It will cost £149.

Midlectron on the Morrow

One of the quietest debuts at the show must have been the Morrow Designs MD2 sitting on the Midlectron stand.

The Morrow is a CP/M Z80A system from the US, where it has been picking up orders steadily during a year that has sorted out some better known names. It has 64K of RAM and is supplied with either twin 250K or twin 500K floppies, plus WordStar, LogiCalc, Microsoft Basic, Personal Pearl and other packages.

The box has an RS232 port to communicate with a modem or a printer, and an expansion port will let you link four drives to the machine. A hard disk version is due in January.

Midlectron (077382 6811) is selling the MD2 for £1,534 and the MD3, with the 500K floppies, for £1,755.

Taskmaster in business

Business users trekking around Compec may have found Dacoll's £3,335 micro, Taskmaster, an attractive proposition.

Although it runs the company's own operating system it also takes CP/M.

It comes with twin 1Mb 5¼ disk drives, CP/M interface, monitor and keyboard and will act as a micro or communicating terminal.

The company has produced its own suite of software for Taskmaster — financial applications include sales, nominal and purchase ledgers, sales invoicing, payroll, financial modelling and Wordstar word processing. They also have production applications, and the starting price for each piece is about £230.

Applications can be bought separately or together from Dacoll (021 351 5451) and will be available at the same time as the hardware, in early January.



Dacoll's Taskmaster — jobbing micro.

Fuji hedges bets on mini disks

Fuji has responded to speculation that IBM will produce a 3½in disk drive for the PC. Suitable disks have now rolled off Fuji's presses and are expected to sell from early February for under £4 each.

These disks will be suitable for the Apricot (Pro-Test, issue 36) and

any other micro using 3½in drives.

Fuji also has 3in diskettes out which will fit the Hitachi disk drive, and if data is lost on any disk sold by Fuji, distributors Magnum Media guarantees to pay for the data to be put back on.

Anyone interested in these products should call Fuji's two distributors — Bosledge in Manchester (061 834 7339) or Magnum Media (0734 734874).

Software house Microfocus, in Berkshire, now has a companion to its Personal Cobol. It is Bostel, a pre-compiler allowing you to do structured programming in Cobol, for £805, on anything running CIS COBOL, or Level 2 COBOL. Microfocus is on 0635-36246.

Cromemco set for UK re-launch

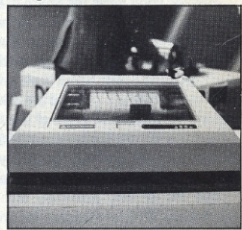
Cromemco's micros are due to get a face-lift in a re-launch of the full range in the UK.

Enhancements to Cromix, the Unix-like operating system that runs on its 68000-based machine, and improvements in disk capacities should be made in coming months. More immediately the company plans to implement Micro Focus' Level 2 Cobol.

The Cromemco distributorship in the UK has passed from Comart to Jarogate and Jarogate managing director Robin Tracey intends to re-introduce the systems, from the C-10 personal computer to the 68000-based machine, to UK business micro users. There are about 3,000 Cromemco systems installed in this country but the Cromemco name has never had the prominence here that it has in the US.



Jarogate's Robin Tracey — relaunching Cromemco.



Anadex DP-9001B — £910 performance.

VIEW FROM AMERICA



By Chris Rowley

Everyone's peeking in windows

Texas hold 'em is what they call the game they play in the annual World Series poker contest held in Las Vegas' Horseshoe Club. This is big money poker, with as much as \$700,000 in a single pot by the end, when after days of play, things have come down to 3 or 4 of the very best, most money players with nerves of steel and very fat wallets.

1984's competition stands to be considerably enlivened, however, by the entrance of a player with nerves of silicon.

In a \$1 million challenge, poker writer Mike Caro, also known as the Mad Genius of Poker, is pitting his Pascal poker program on an Apple II against the best in the world. The game will take place at the Horseshoe during the regular World Series and will be one on one, freeze out, \$100,000 buy in, winner takes all.

The current champ, Tom McEvoy is in, so is two-time champ Doyle Brunson, and the flamboyant Bob Stupak, alias the 'world's greatest player', has said he will bet \$1 million to beat the computer and he promises to give his Rolls to Mike Caro if he loses. Caro doesn't have a Rolls, so if the program fails this awesome task he will give Stupak a hammer and 'let him smash my computer in front of the whole world'.

Some things can happen only in America. Software news is the rushed announcement of Microsoft's Windows to go toe-to-toe with Visicorp's VisiOn in the rapidly intensifying windowing wars. VisiOn and Windows are radically different approaches, Windows being cheaper by far (\$250 maximum) and basically just an expansion of the environment of MSDOS allowing graphical applications, while VisiOn is a complete environment system requiring 2Mb of memory and offering Lisa-like capabilities.

Windows will face problems in attracting PC users because it cannot handle some of the popular 'misbehaved' software, such as Lotus 1-2-3, which circumvent MSDOS.

But VisiOn won't work with them either, and Visicorp will release a whole new line of applications programs. Meanwhile, Quarterdeck Software of LA's recently completed Desq is another inexpensive windowing system that will be open to existing software allowing flexible integration of old programs on an IBM PC: sure to be popular with small businesses.

The next few months will see heavy ad-fall from VisiOn, Quarterdeck and Microsoft, and by next summer at least half a dozen other competitors for the IBM windowing market expect to have their wares on the streets. Far too early to tell the winner in the resulting crunch, though one interesting point to note, perhaps, is that while software developers working on VisiOn are having to use a DEC Vax mini, programming for Windows will take only a PC.

More and more new hardware products are in the works. Watch for an IBM-compatible MSDOS TRS80 launch in the spring. CompuSource of Minneapolis has announced the Abacus portable, Apple-compatible system that can run CP/M and Apple software. The machine will come in an aluminium case with 9in amber monitor, 64K RAM, with optional disk drives, ports, and will weigh 28lbs. A single drive system will cost \$1,595.

Further good news for Apple users was the announcement by Rana systems of an MSDOS 16-bit software box for the Apple IIe and II+. Quoth Apple chief John Sculley: 'This is a gateway to the MSDOS world.'

The display of PC Jr brought further mixed reviews and allowed Atari and Coleco to safely boost their prices on new systems. Atari's 600XL rose from \$140 to \$180 and the 800XL rose from \$240 to \$280. Coleco put up the wholesale price of the Adam by 25 per cent to \$650, thus ensuring a store price in excess of \$800. Coleco is now not seen as able to reach its goal of 400,000 units by Christmas. And big retail chains (JC Penney, K-Mart) will not stock Adams.

The PC Jr did, however, stir up excitement among magazine publishers. US micro magazines are booming and nobody wanted to be left out of the potential Junior pie. Three titles have already been announced for January launches, and more may be in the works.

Sanyo string

Users of Sanyo's desk-top micros can now link their systems — at a price, but with the possibility of bringing in other manufacturers' micros.

Logitek has launched its networking system using Micromite hardware and software that it has developed with Science Systems.

The Micromite box has a built-in hard disk, and a tape streamer can be added. It will support as many as 254 Sanyo micros, but the fact that the data is held in a CP/M-compatible format means that it can also be accessed and updated by any CP/M-based micro.

The system incorporates a hard disk that can be from 10Mb to 40Mb depending on your requirements.

The rest of the network consists of co-axial cable and an interface card for each micro. Its data transfer rate is 78,000 cps.

An automatic file-locking mechanism takes care of security on the network but the tape streamer, as a second line of defence (in a different context), can save 20Mb in six minutes.

The Sanyo range starts below £1,000 (for the 1100) and at this level it will soon be joined by the MBC-555 IBM-compatible micro, running MSDOS and CP/M86.

The cost of networking from Logitek (0257 426644) runs to £4,315 for a unit with 10Mb, or £5,795 if it includes the tape streamer.



Logitek brings Sanyo into the net with Micromite hardware.

ZX81 goes on-line with a modem

The ZX81 may be puny but it doesn't stop people bringing out new add-ons and software. Latest goodie to appear is an adaptor that allows you to hook up the ZX81 to a modem.

The device comes from Micro-computer Resources (0727 72917) and is aimed at the user who wants to dial up Prestel or one of the several hobbyists' bulletin boards in operation around the country.

For £29.95 you get a device the size of a Rampack which contains all the hardware and software to hook into a modem.

It generates Prestel compatible

graphics but only in black and white. The firmware also turns the ZX81 into a viewdata terminal with functions programmed into the keyboard.

To call up Prestel you will also need a modem which the company will supply for £69.95.

In addition to accessing the pages of Prestel, you can use the adaptor to download software, save frames to tape or print them out on the ZX printer.

To dial up the bulletin boards a different kind of modem will be required because they use a different transmission protocol.

In downloading software the unit will accept syntax that is incompatible with Sinclair Basic, reading the incoming lines as REM statements for you to edit as necessary.

Software can be either edited and RUN, or stored on tape.

Fourth generation Ramis arrives for IBM XT

One of the mainframe world's more sophisticated pieces of software has been scaled down to fit on the IBM XT/370, launched last month.

Ramis II, the fourth-generation language produced by Mathematica Products Group, should be available for the XT/370 PC derivative when IBM starts shipping it in

the second quarter of next year. Mathematica is now continuing to develop the software to run on micros built around the Motorola 68000 and running the Unix operating system.

For the XT/370 it will cost £995. Mathematica in the UK is on 01-580 3681.

Learning the hard way

By Bryan Skinner

In the last few months, Sinclair, Heinemann, John Wiley, Griffin & George, Macmillans and many others have launched a wide range of educational software aimed at primary school children. This sudden interest can only be due to estimates such as the one by CAP that the educational market could grow to some £75m by the end of 1984. Certainly, the involvement of CAP (one of Europe's largest software producers) with ASK (an English software house specialising in educational programs) points to a booming market.

The Government likes to take much of the credit for this flourishing industry, pointing to its two recent schemes; MEP (Microelectronics Education Program) and MIS (Micros In Schools). While there may be an element of truth in the claim, the fact of the matter is that to date, the Government's policies have been substantial, ill-formulated and misapplied across the land. It often seems as if its micro schemes are mere window dressing hiding cuts in other, crucial, areas of education. Certainly, a micro in every school looks good on paper, but who, for one moment, can believe that one Spectrum between 1,500 children teaches anything more about technology than tolerance and an acute

awareness of the meaning of time-sharing?

The reality is that since the Government did not, would not or could not provide any direction in terms of how micros were to be used in schools, local education authorities, education computer centres and individual head teachers have had the final say in the matter. This is, of course, in the best tradition of British education. It is also, in this particular instance, the best recipe for disaster that could have been devised.

The reason for this is that all too often, head teachers, LEA officials and even educational advisers haven't a clue what a micro is, let alone how it could be used effectively in schools. What tends to happen is that a handful of BBCs are virtually monopolised by privileged CSE and O-level Computer Studies students in the 4th and 5th years.

Ironically, the CSE and O-level syllabi and exams are anachronistic, bearing little relationship to the pupil's needs or experiences with microcomputers. Dreamt up by University boards raised on administration programs written in Cobol and running on mainframes, they are a far cry from assembly language graphics programs being turned out by the more advanced students in enlightened regions.

That, at least, is one saving grace

of the flexibility of the system. There are several areas in England, where, by the efforts of a few far-sighted individuals, microcomputing is not only being taught well but also used to raise revenue from high-quality programs written by children. In such areas you can also find teachers from other disciplines.

The reasons most teachers don't use micros in their subjects is that they lack familiarity with the machines and there simply aren't the resources to let each pupil get a fair crack at using a program.

The Government does provide some training, usually via a local education computing centre but these are often staffed by ex-mainframe programmers who view micros as mere toys — the head of one such establishment was overheard to say but a year ago that he'd smash any Spectrums he found in any schools in the borough.

Since most schools can only send one or two teachers on the obligatory four day course (two days for primary schools) it's hardly surprising that most teachers know very little about the subject. Moreover, since many micros in schools are, for internal political reasons, given over to maths departments (and the myth that mathematical fluency is a prerequisite for computer literacy is still rife), it's hardly surprising that

there are pupils who know far more about the subject than their teachers.

Kenneth Baker, Minister for Information Technology, claimed recently (at a launch of educational software) that Britain led the world in the area. His horizons are somewhat limited. In France, for example, there has been considerable governmental expenditure, (far higher than that in Britain and for far longer) on the supply of equipment, teacher training and program development.

The quality of a great deal of educational software leaves much to be desired. All too often the publishers make extravagant claims for their products, failing to distinguish between teaching and drill/rehearsal or testing. It's quite easy to write a program to test an area of knowledge, but quite another thing to produce a program that will teach something. Even with advice from 'leading educationalists' many of the programs are dull and boring, merely replacing text and exercise books with the screen.

The sad lack of imagination and ingenuity in this area reflects the parlous state of education in this country.

Education is a white elephant which no-one knows what to do with — micros in education seem to be going the same way.



RIISING THERMAL — This sub-£100 thermal printer will be available early next year from Lo-Kata. The Cosmoprint takes 4½ in paper and boasts both Centronics and RS232 interfaces. Lo-Kata claims the printer will print on 20, 40 or 60 columns and can handle dot-addressable graphics. It is expected to cost £99. Lo-Kata can be contacted on (0326) 73636, but its equipment is more usually found on the seven seas — the Cosmoprint has developed from its work on a device called Navtex, a micro-controlled teleprinter for navigation information, and it comes from Lo-Kata's marine electronics division which usually supplies the likes of Chay Blyth.

Zita launch for bag and baggage

Zita Computers has taken the next step in its rehabilitation (Issue 36) by launching an IBM-compatible portable, the Zita-PC.

With 128K and twin 320K floppies the Zita-PC costs £1,895 in its standard form. This undercuts IBM's price by a large margin but the difference is even more pronounced in the Zita-PCW, which includes a 6Mb Winchester and a 500K disk for £2,995.

With unintentional hilarity Zita's press announcement of the machines referred to 'a 16-bit IBM compatible intelligent briefcase' — the Zita-PC, like the company's other systems, comes in a leather case complete with shoulder strap.

CP/M-86 is optional on the machines; PASDOS and GWBasic are supplied as standard. Zita (0784 63212) also plans to offer software packages bundled with the systems — the Perfect range is one option.

Zita is offering free on-site maintenance on all its systems, and for the duration of Compec it was giving away either a BBC B or a Smith Corona TP-1 printer with each Zita-E or Zita-P sold.

Acorn adds on sponsorships

If you ever wondered why Acorn has such trouble with promised add-ons you may be less than happy to learn that the company is spending large sums of money as a sports sponsor.

Following its £90,000 sponsorship of James Hunt's brother as a Formula 3 racing driver, Acorn is sponsoring the World Chess Championship Semi-Finals that started on Monday.

Apart from putting up £48,000 in prize money, Acorn is also footing the bill for staging the event at London's Great Eastern Hotel and paying the contestants' expenses during their month long stay.

On top of all this Acorn has splashed out with full page adverts in the national press which not only suggest that Acorn is the 'brains behind these battles of mental giants' but also go on to say that the humble BBC micro was used to predict the likelihood of each contestant getting through to next year's finals.

The semi-final line up pits twice-defeated finalist Victor Korchnoi

against the latest Russian prodigy Gary Kasparov, and Russian veteran Vassily Smyslov against Hungarian Zoltan Ribli.

The Korchnoi-Kasparov match promises to be a real bruiser. Many will remember the psychological warfare in the last two world championships between Korchnoi, who had defected from the Soviet Union, and Anatoly Karpov, hero of the Russian people.

According to Acorn's ad the probabilities of victory for each contestant is 89 per cent for Kasparov, 60 per cent for Ribli, 40 per cent for Smyslov and a mere 11 per cent for Korchnoi.

It will be interesting to see how accurate Acorn's predictions are. The question is, if it has got it wrong will it receive yet another rap over the knuckles from the Advertising Standards Authority?

Micro chess fans who want to see the action should go along to the Great Eastern Hotel, between 4pm and 9pm every day until the scheduled end of the semi-finals on December 23.

MSDOS gets upgrade

Microsoft has scored a major coup with its announcement last week of a windows extension to MSDOS that is backed by most leading micro manufacturers and many software houses.

Windowing allows the user to switch quickly from one task to another and was pioneered on micros by Apple with the Lisa. It has been designed to work with Microsoft's other recently announced product, a mouse interface.

Companies that have already

agreed to support the Microsoft Windows include Apple, Tandy, Hewlett-Packard, Texas, Digital Equipment and Wang. Software firms backing the concept include Lotus, Peachtree, Ashton Tate and Software Arts.

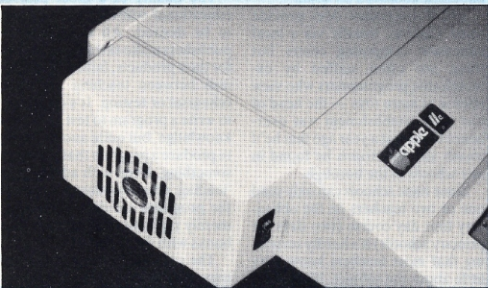
The level of endorsement for a new product is unprecedented in the micro business and was clearly designed as a pre-emptive strike by Microsoft to emphasise MSDOS's claim to be the industry standard operating system for 16-bit micros. Windows will not be available

until April next year and as yet it is not possible to forecast what it will add to the cost of a new system. However, some American observers are suggesting that the additional cost might be of the order of \$100 to \$150.

UK general manager of Microsoft, David Fraser, said that Windows is part of a continuing process to provide an upgrade path for MSDOS users. In the pipeline is a multi-tasking, multi-user capability and a networking extension. 'Our network will include parts of Ether-

net and parts of other networking protocols,' he said.

With the addition of all these extensions MSDOS is looking more and more like Unix, the supermicro and minicomputer operating system devised by Bell Laboratories in the USA. This is no accident. Microsoft has its own version of Unix called Xenix. 'With these new enhancements Microsoft can now offer a clear upgrade path from MSX-DOS on low cost home computers through MSDOS to Xenix,' said Mr Fraser.



FAN MAIL — As people try to cram more and more high-powered circuitry into the humble Apple (see last week's Apple report) some form of cooling becomes essential. Riding to the rescue comes Pete and Pam Computers (0706-212321) with colour-matched fan and case that simply hooks on to the side of your Apple II or IIe. It is by no means the first such device on the market but at £44.85 it is one of the cheapest and just the thing if you are trying to squeeze a 68000 processor and 256k of RAM into one of your Apple's expansion slots.

dBase II group

Ashton Tate held a meeting in London last week to establish a UK dBase II User Group.

About 150 people attended, and the group will aim to be independent of Ashton Tate although the company is willing to provide secretarial services plus some finance.

A committee and chairman are likely to be elected in the near future — dealers are expected to nominate the committee. A subscription has yet to be decided on.

An application register is being set up so that you can look

up who is doing what with d-Base II and contact them for advice.

For further information, contact Ian Turner at Ashton-Tate (UK) Ltd on 0908 568866.

● Ashton Tate has released dBase 11 version 2.4 which it says is fully compatible with earlier versions while adding new features. The most significant appear to be the ability to manipulate screen colour and set customised functions from the keyboard.

Other facilities include improved debugging diagnostics.

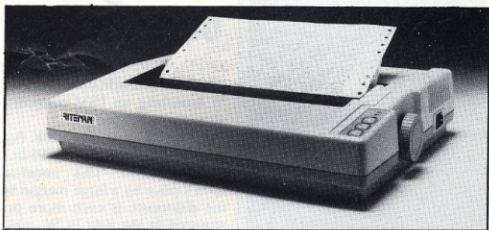
PERIPHERALS

Printers: Micro Peripherals (0256 3232) has three new dot-matrix printers from the Star range. These are two versions of the Star Gemini, the 10X and 15X with 80 and 132 columns respectively, and they run at 120 cps. The 10X costs £344 and the 15X £458. The Star Delta is an 80 column unit that runs at 160 cps; it includes an 8K buffer, and serial and parallel interfaces are fitted as standard. The company has also launched the Riteman A1 matrix printer for £344. It prints at 120 cps across 80 columns and features graphic and italic typefaces. Zygal (08692 3361) has also announced a trio of printers, two

of which are daisywheel units. The Fujitsu SP320 is a 48 cps daisywheel that costs £850 and comes from the same range as the SP830 80 cps model. The Diablo 630 ECS (Extended Character Set) is a daisywheel printer with firmware incorporated to reproduce the IBM 192 character set. Zygal has also become a distributor of the Mannesmann-Tally MT-80 dot matrix printer, which it is selling for £285.

Data Entry: Some years ago a company called Quest pioneered the idea of hand-written data entry, and its Micropad has been taken a stage further by BCU Computers (0689 75334) with its

PCN rounds up the latest add-ons.



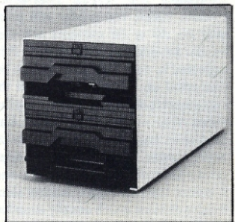
Riteman A1 with graphics and italics

Telepad. The Telepad is a 13in by 11in pad, a screen of 40 characters, and an electronic pen. It runs CP/M and interfaces to most computers through V24 or RS232C interfaces. The snag — it costs just under £2,000.

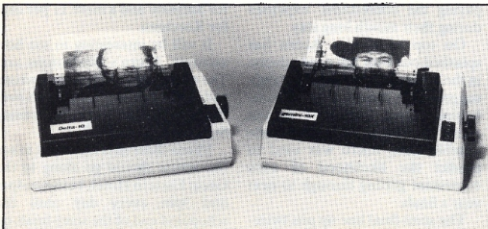
Communications: Modular Technology (08692 3361) has moved into fibre optics with its Interfibre FD 192 modem, which costs £150. It is designed for users operating in harsh environments or where the possibility of electrical interference is particularly high.

Mass Storage: The Alpha 10+10 offers users of a number of business micros 20Mb of storage in a unit that includes a 10Mb hard disk and a 10Mb removable

cartridge. It comes from APS Microsystem (0273 420195) and runs on the Duet-16, IBM PC, Sirius, Apple, Superbrain, Commodore and DEC systems. The price is £3,400.



20Mb on the Alpha 10+10.



Delta and Gemini Stars.

Hitachi high-flyer

Japanese giant Hitachi has launched its Personal Computer with more than the usual care to see that it stands out from the pack.

The PC carries a two-year on-site warranty, exceptional graphics with 192K to drive the monitor, and for the first six months at least, a system generator package from Compact Software included in the price.

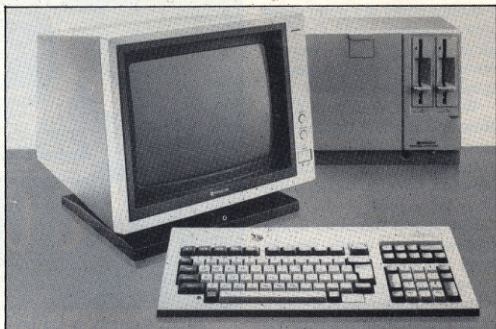
The Hitachi system runs MSDOS on an Intel 8088 with 320K of RAM, of which 128K is available to the user. The memory can be expanded to 576K. It also has twin half-height, double-sided double-density 5¼in floppies and an expansion slot that will accommodate a Winchester drive.

For £2,595 you get the basic system with a slim keyboard, the two floppy drives, and a 14in high-resolution colour monitor.

This unit also carries built-in interfaces for printers and light pen, with Centronics and RS232 as standard.

The graphics on a forerunner of this system, the Hitachi Peach, were immediately eye-catching and Hitachi seems to be building on it with the PC. From the spec it looks unexceptional, with 15 colours and definition of either 320 or 640 by 200, but Hitachi makes a distinction between active and passive colour and its active implementation is striking.

The Hitachi Nucleus System Generator has come out of cooperation between Hitachi and Compact; it is a series of programs designed to give non-technical users an immediate means of getting started. It can be integrated with other applications packages that Hitachi is offering in a conspicuous attempt to avoid the traditional



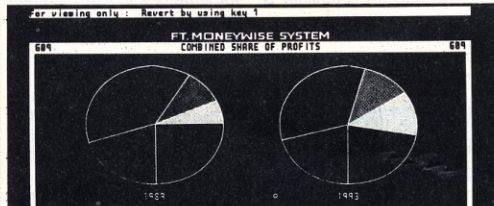
Hitachi's PC: designed to bring colour to your cheeks.

'Japanese software' syndrome.

The two-year warranty reflects the equally traditional Japanese concern for quality control. The

terms of the warranty guarantee you the attention of Hitachi's own engineers on your site.

Hitachi (UK) is on 01-848 8787.



Moneywise's graphics: pie charts, bars or line graphs.

Moneywise has FT's blessing

Spreadsheets came of age this week as The Financial Times put its name behind FT Moneywise.

This 16-bit Fortran-based package will be available in January 1984

on the Sirius and IBM (the latter with optional colour graphics). Costing £395 the only problem may be that it needs 256K to run in. This does, however, allow you to use 67,000 cells in the processing. Offering extremely fast calculations, on-screen graphics, full report and graph generation via dot-matrix printers, help files and a security dongle, FT Moneywise looks a cut above the rest of the spreadsheet challengers.

SOFTWARE NEWS

Business

CP/M: Moving down from the mainframe arena the statistical package Minitab is now available from Cle.Com (021-443 4392). Besides CP/M 2.0 you'll need twin floppies with at least 250K each or a hard disk, and 64K of memory. The range of features in the package reflects its mainframe origins. The price is £750.

Unix: Bivius Systems (0903-212481) has approached Unix via RM Cobol and has produced a number of packages in the financial area. There are general accounting applications like ledgers, order processing, and payroll, a membership system, and a patient administration and accounting system for hospitals. So far they have been ported on to Plexus, Onyx, Bleasdale and Tandy systems — ABS, Wicat, Cifer and Britannia are next on the list.

IBM, Apple: Kempner Tregoe (Windsor 56716) has launched Decision Aide for users of IBM and compatible micros and the Apple IIe. The package is aimed to help managers make correct management decisions, and besides the central suite it includes a variety of help functions.

Unix: Office automation and financial management on Unix systems are what Precision Software (01-330 7166) is aiming for with its Unigem software. Using menus to keep you away from the deepest mysteries of Unix it combines such functions as text editing and document retrieval with ledgers and sales analyses. Precision also has Mistress, a relational database, running under Unix.

Education

Spectrum, Commodore: Wigit Software is adding to its programs for pre-school and primary school-age children and converting its range to run on the Commodore 64 and Acorn machines as well as the 48K Spectrum, which it has written for so far. Its next release, to be published by Mirrorsoft, will be Quick Thinking, a pair of games to practice mental arithmetic on. The price is £6.95. Wigit is on 01-444 5285.

Graphics

BBC Micro: Two programs from Jamssoft (01-262 7441) are now available to budding artists who have an RH Electronics light-pen as well as a BBC system. Artfun is

for cubists, building images from simple solid squares. Paint handles lines, points, squares, circles, rectangles and triangles and you can fill areas from the size of a single pixel to a full screen. Prices are £9.95 each.

Sirius: Bargraf-Drawing is the first product in Hi-Tek's (0954 81931) Thinksoft range. The Bargraf section is self-explanatory; Draw treats the screen as an 800 by 400 page; and a third element, Slide-Show, allows you to save images created by the first two. You'll need a minimum 256K, and output can be as simple as an Epson dot-matrix printer.

Duet-16: As a package with the Japanese-built Duet, Itch (0438 316561) is offering the Graphite general purpose graphics software for £7,000 — this buys you the micro, a plotter, a tablet, and the Graphite software.

Games

Atari: Hard to believe, but Atari is billing Donkey Kong as a new show-stopper in its latest user magazine. Eastern Front (1941) is less hackneyed and shows much more promise, pitting you as the German commander fac-

ing the machine as Russia. It needs 16K of RAM, a joystick, and costs £29.99.

Lynx: So named, presumably, because you need sharp eyes to spot any software for it. Bus-Tech aims to fill the gap with new programs that include a 100 per cent machine code space invaders called Ynxvaders for £7 and Jumping John for the same price. Bus-Tech is at 19 Landport Terrace, Portsmouth.

Spectrum: Mushroomsoft (0752 362985) has sprung up in the West Country and its first product, for the 48K machine, is called Big-Time. It takes you into the wheeling and dealing of pop music, for less than the price of an LP at £4.50.

Spectrum: From PSS (0203 667556) come Crazy Kong and Hopper, both for the 48K machine and both at £5.95.

Various: Or to put it another way, the Spectrum, Commodore 64 and BBC are the machines on which Vision Software Factory's (01-748 7478) latest games will run. For the Spectrum Moon Buggy, Sci-File, 1994 and Arcturus are due for release this month, for the BBC Pengi and Digger, and for the 64, Boris.

PCN correspondents are all at sea

I must ask this question. Is America really at a point south west of Lands End? Or does your correspondent secretly write his 'View from America' column from the Azores?

Way back in Issue 6 Chris Rowley's article is headed by a map-section with an arrow pointing roughly to the Azores, America? That's 3,000 miles away to the west!

You repeat this error in the following three issues, then in Issue 11, Japan seems to have moved around the hemispheres, and then in Issue 15 it's called 'Paris'! And so it goes on; the error is continued right up to my latest copy.

Is it a trick to stop the Russians finding Silicon Valley, I ask myself.

Perhaps a latter-day Columbus can get on his ship and search for this new land in the middle of the Atlantic.

Or, perhaps PCN could use an Atlas.

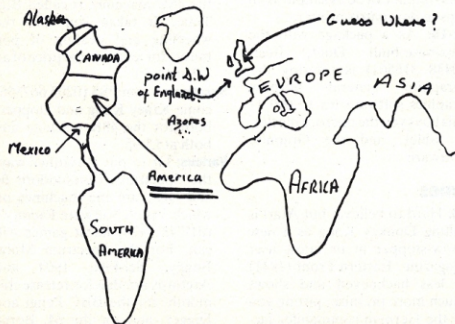
PCN £10 Star Letter



To help all PCN editors, columnists etc in the future, I hope you will issue copies of the standard reference guide to the positioning of America below.

Jeff Best
Brighton,
E Sussex.

I feel like cracking the one about how the earth moved — but I'll claim artistic licence instead. But you win the £10 — Ed.



RANDOM



ACCESS

Don't carry a LOAD on your shoulders, unburden yourself on PCN's letters page.

CUP educational software for home

I refer to the letter from Mr R Hughes (Issue 29). He is certainly correct that there is a shortage of good educational software available for home users, but we and other publishers are very conscious of this shortage and we are doing our best to alleviate it.

Educational software produced in conjunction with the MEP and CET is available to the public, although at a slightly higher price than the MEP subsidised price at which it is made available to the UK education market. If your correspondent is interested in making a purchase, he should apply direct to us.

We are also in the process of developing educational software packages specifically for home use, which we hope will be available at a more economical price than the very high quality, heavily documented publications required by

schools. If your correspondent will 'watch this space' over the next few months, I am sure he will find that his complaint is satisfactorily answered.

Thomas Hardy,
Editor, Software Unit,
Cambridge University Press

Small feet problem requires binders

Having recovered from that most dreaded of diseases PCN-itus, I have now come over all peculiar with a particularly nasty bout of . . . Micropaedia.

This strange complaint has nothing to do with having excessively small feet, but due to the fact that my much treasured collection of the above is strewn all over the bedroom floor.

I hear you ask . . . what's the cure? Well, may I suggest an all expenses paid trip to Hawaii? Failing that how about bringing out binders exclusively for one's accumulation of Micropaedia?

R Willis,
Fairwater,
Cardiff.

Fret not; aware that a build up of paper deposits can affect your health, we have designed a Micropaedia binder. It's yours for £3.50 — Ed.

Another slant on software piracy

While many authors have written numerous articles in the computer press describing in gruesome detail how to beat the programmer's curse, the soft-

ware pirate, none to my knowledge have asked the most fundamental and basic question imaginable *ie* is the software worth protecting?

Many would no doubt say yes, arguing that copying a world shattering games tape to give to a friend is unfairly robbing the programmer of the royalties they would receive had the recipient of the copy bought the real McCoy.

But what of the numerous programs sold on cassette which are written in Basic, or any other high level language when it comes to it?

After all, any reasonably competent programmer could well write his own version of a commercially produced Basic game. Or, after studying the listing, rewrite pieces of the code and utilize them in a home-made program.

I have sympathy, however, for authors who write complex machine code programs who get their royalties taken away by someone who couldn't care less whether the author got them. Such blatant theft should be heavily fined and the big fish tracked down and made to pay a reasonable amount of compensation.

I call upon programmers everywhere to stop and think awhile. Is your program *really* that good? If so, then go ahead and get your little masterpiece published commercially.

If the answer to this question is no, then why not send it in to PCN? It's much better for someone to pay 50 pence for a magazine incorporating your program, than have some poor sap blow six quid, as I have done in the past, on a program not worth the screen space. Isn't it?

Stuart Adamson
Hedon,
Hull.

We offer fame (not exactly a fortune) and fun, so why not put your programming skill on the line, do as the man suggests and send your programs in to PCN — Ed.

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

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Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

Write to: Max Phillips, Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

When BBC B drives mean extra expense

Q I am thinking about buying a model B microcomputer with disk drives and, not being all that familiar with drives and the like, I enclose the following questions.

If I buy disk drives that are advertised as BBC compatible, will I be able to connect them to a BBC (fitted with a disk interface and DFS) without any further hardware modifications? Are they all as good as one another?

Joachim Fleury, Amsterdam, The Netherlands.

A When the BBC B has been fitted with the disk interface and the DFS (Disk Filing System) it is capable of being attached to a number of drives, as it uses one of the industry standard disk interface chips.

One of the main things to note about the Acornsoft DFS is that it contains no Format program. This is vital when using new disks. If the BBC drives are bought, then this program comes as part of the package on a disk. If the Acornsoft DFS is purchased by itself, then you need to buy a separate format program, probably from the same dealer you get your drives from. If one of the other DFS's is used ie Watford or Amcom, then things are a little different (see issues 33 and 34).

The Watford DFS provides a format program and so does the Amcom. Both provide a few other extras all as part of the DFS chip.

All the DFSs will operate any compatible drive, the hardware needed being part of the BBC interface.

There is also a set of links (three and four at the bottom right hand of the keyboard) which can be made or unmade to operate various different drive types. The four main types are, Olivetti, Tandy, Cumana (which use both links unmade); MPI drives (4 made, 3 unmade); Tandon, Shugart or any 6msec access (3 made, 4 unmade); Tandon 4msec (both

links made). As you can see, the easiest drives to attach to a BBC are those that require both links unmade. Be careful as any alterations may invalidate your warranty, if you do it yourself.

The only extra hardware you will need is a connector cable. This should be provided by the dealer, as should the link setting.

To sum up, the BBC is capable of being attached to a wide range of disk drives, all of which are pretty much the same. The best thing to do is to buy your drives from a source that is capable of giving you any help you may require.

VHF problems with ZX81 can be foiled

Q I own a 16KZX81 and use it on a UHF portable black and white television. As we also have a colour television, which is VHF because of the wavelengths transmitted in Ireland, my ZX81 causes great interference. Please tell me if there is a way of solving this problem as it causes arguments in the household.

Could you also tell me if I would need to buy a new tape recorder if I purchased an Acorn Electron, as my tape recorder doesn't have a DIN socket.

James Webb, Co Tipperary

A The way to deal with this involves screening off the ZX81 from the telly, so sandwich a piece of metal foil between two pieces of card, open up the ZX81, put in your foil between the keyboard and the circuits, then put it back together again so the foil makes contact with the heatsink. But make sure the foil doesn't short out any connections. This approach, incidentally, should work for any micro, although it will invalidate your warranty.

You won't need a new tape recorder for an Electron — what you will need is to get a new lead, from a dealer.

Joystick options for the Spectrum

Q Is it possible to set up the Spectrum Interface 2 so that the joysticks will work with any game? Is it programmable in this sense?

P Bennett, Lewisham, London.

A Interface 2 isn't programmable at all, but is simply a device that plugs into your edge connector and allows you to use two Atari-type joysticks. It won't work with all games, but a number of software houses — check the Sinclair ads — are now making their games compatible with it, and this number is likely to increase.

A programmable joystick interface is a completely different beast altogether. What these do is simulate any keyboard function. So, if you have a game that reacts to the cursor keys, the interface can be programmed to fool the micro into thinking your joystick movements are actually these keys being pressed.

The snag is, of course, that if you want to use cartridge software you've still got to get Interface 2, but if you're not worried about this try Stonechip on Aldershot 318260, or Fox on Basingstoke 20671.

Two-key rollover, BBC Model B

Q In many micro magazines, I have read adverts where 'two key rollover' is mentioned; some are for my own micro, a BBC model B. I have yet, however, to find the meaning of this troublesome term. Could you please enlighten me?

David Machin, Longton, Stoke On Trent.

A The term 'two key rollover' means that if one key is pressed and then another is pressed while holding the first, the computer will identify both keys.

This can be demonstrated quite easily. Simply press one key, ignore any repeats, then press another, while holding down the first, and see if this one is printed onto the screen after the first. If it is, then you have two key rollover.

If you now press another key, while holding down the first two, probably nothing will happen and it will be ignored (unless you have three or more key rollover). What is happening is that the keyboard monitor routine will take notice of the first key pressed, and the second, but after this, any more will be ignored.

Machine code on the Oric

Q I would like to get into 6502 machine code; please could you explain the difference between an assembler and a disassembler, and the difference between these and a machine-code monitor?

Also, I would like to know what the POS command does on my Oric as this is not explained in the manual.

Lastly, please tell me if there is an Oric equivalent to the Spectrum's IN command, which lets several keys be pressed at once as opposed to INKEYS which only lets one key be pressed at a time.

Jasper Mallinson, Weymouth, Dorset.

A Put simply, an assembler is a program which allows you to enter a 'machine code' program consisting of what are called mnemonics. These are the short-hand words which programmers use to tell the microprocessor what to do. For example, there is a mnemonic 'STY', which means store a value in the Y register. An assembler will literally 'assemble' the op-codes into the numbers needed for the processor to 'understand' the codes.

A disassembler does the reverse. It will go through a section of memory and tell you the mnemonics represented by the numbers in each byte. It's the sort of thing you would need to de-bug a program you had written using an assembler.

A monitor is a program which allows you to edit sections of memory by doing things like moving blocks of it about. It will also let you run parts of your program; look at the contents of the registers and so on.

On the Oric, POS tells you the current column position of the cursor. It takes the form C = POS(0).

The Basic command IN on the Spectrum can be used to read the input/output bus and since the keyboard is connected to this, you can get information about keys pressed.

There is no direct equivalent to either IN or OUT on the Oric because its input/output is memory mapped, whereas the Spectrum has a separate, addressable bus.

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PCN Charts

This top 30 games list is compiled from both independent and multiple sources across the nation. It reflects what's happening in high streets in the two weeks up to November 10 and, like the micro charts, does not take account of mail order sales. The micro charts this week show the number of machines sold in the same two-week period so they tell the story in the high street between October 27 and November 10.

GAMES

Top Thirty

	GAME TITLE	PUBLISHER	MACHINE	PRICE
▲ 1 (—)	Lunar Jet Man	Ultimate	Spectrum	£5.50
▶ 2 (2)	Manic Miner	Bug Byte	Spectrum	£5.95
▲ 3 (8)	Flight	Psion	Spectrum*	£5.95
▲ 4 (5)	Hobbit	Melbourne	Spectrum*	£14.95
▲ 5 (—)	Valhalla	Legend	Spectrum	£14.95
▲ 6 (14)	Hovver Bovver	Llamasoft	C64	£7.50
▼ 7 (4)	Zoom	Imagine	Spectrum	£5.50
▼ 8 (1)	Kong	Ocean	Spectrum	£5.95
▼ 9 (3)	JetPac	Ultimate	Spectrum	£5.50
▼ 10 (9)	Gridrunner	Llamasoft	Vic 20*	£7.50
▼ 11 (6)	Penetrator	Melbourne	Spectrum	£6.95
▲ 12 (—)	3D Ant Attack	Quicksilva	Spectrum	£5.95
▲ 13 (28)	Heathrow ATC	Hewson	Spectrum	£5.50
▲ 14 (—)	Chukkie egg	A&F	Spectrum	£5.50
▼ 15 (13)	Horace and the Spiders	Psion/Melbourne	Spectrum*	£5.95
▼ 16 (15)	ZipZap	Imagine	Spectrum	£5.50
▲ 17 (25)	Halls of the Thing	Crystal	Spectrum	£7.50
▶ 18 (18)	Scrabble	Psion/LG	Spectrum	£15.95
▲ 19 (21)	3D Deep Space	Postern	BBC*	£8.00
▲ 20 (30)	Hunchback	Superior	BBC	£7.95
▲ 21 (—)	Purple Turtles	Quicksilva	C64	£7.95
▲ 22 (—)	Splat	ISL	Spectrum	£5.95
▼ 23 (7)	Harrier Attack	Martech/Durell	Oric	£6.95
▶ 24 (24)	Xadom	Quicksilva	Spectrum	£6.95
▲ 25 (26)	Blue Max	Showcase	Atari	£27.95
▲ 26 (—)	Football Manager	Addictive	Spectrum*	£5.95
▼ 27 (16)	Golf	Computer Rentals	Spectrum	£5.95
▲ 28 (—)	Corridors of Genon	New Generation	Spectrum	£5.95
▲ 29 (—)	Bugaboo	Quicksilva	Spectrum	£6.95
▲ 30 (—)	Transylvania Tower	Shepherd	Spectrum	£6.00

*Denotes available on other machines

COMMODORE 64

The best 6 games 4 the best micro send s.a.e. for full list

KONG anirog, GRIDRUNNER anirog, SKRAMBLE anirog, 3D TIME TREK anirog, HOOVER BOWER llamasoft, ATTACK OF THE MUTANT-CAMELS llamasoft

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PCN Charts

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and, like the games, is updated every alternate week.

PCN Charts are compiled exclusively for us by MRIB (Computers), London, (01) 408 0250.

HARDWARE

Top Twenty up to £1,000

MODEL		PRICE	DISTRIBUTOR
▶ 1 (1)	Spectrum	£99	(SI)
▶ 2 (3)	BBC B	£399	(AC)
▼ 3 (2)	CBM 64	£229	(CO)
▶ 4 (4)	Vic 20	£140	(CO)
▶ 5 (8)	ZX81	£45	(SI)
▼ 6 (5)	Oric 1	£99	(OR)
▶ 7 (7)	Dragon 32	£170	(DD)
▼ 8 (5)	TI/994a	£99	(TI)
▶ 9 (10)	Atari 800	£300	(AT)
▼ 10 (9)	Atari 400	£150	(AT)
▶ 11 (17)	Apple 11e	£750	(AP)
▼ 12 (10)	Sharp MZ80A	£349	(SH)
▶ 13 (14)	Lynx 48/96	£225	(CA)
▼ 14 (13)	Aquarius	£60	(MA)
▶ 15 (16)	Sharp MZ700	£240	(SH)
▶ 16 (20)	Tandy Colour	£240	(TA)
▶ 17 (—)	Electron	£199	(AC)
▼ 18 (15)	CGLM 5	£150	(SO)
▼ 19 (11)	Colour Genie	£168	(LO)
▼ 20 (18)	Epson HX20	£472	(EP)

Top Ten over £1,000

▶ 1 (1)	ACT Sirius	£2,525	(ACT)
▶ 2 (2)	IBM PC	£2,390	(IBM)
▶ 3 (7)	HP86A	£1,438	(HP)
▼ 4 (3)	Apple 111	£2,780	(AP)
▶ 5 (5)	Commodore 8000 series	£1,200	(CO)
▶ 6 (6)	Epson QX10	£1,995	(EP)
▶ 7 (9)	Olivetti M20	£2,180	(OL)
▼ 8 (4)	DEC Rainbow	£2,359	(DEC)
▶ 9 (—)	Apricot	£1,760	(ACT)
▼ 10 (8)	British Micro	£1,495	(BM)

AC Acorn Computers. ACT — ACT. AJ — Anderson Jacobson. AP — Apple Computer. AT — Atari International. BM — British Micro CA — Computers. CO — Commodore. DEC — Digital. DR — Dragon Data. EP — Epson. HP — Hewlett Packard IBM — IBM. LO — Lowe Electronics. LL — Lucas Logic. MA — Mattel. OL — Olivetti. OR — Oric. SH — Sharp. SI — Sinclair. SO — Sord. TA — Tandy. TI — Texas Instruments.

LYNX SOFTWARE

FROM BUSTECH. NEW RELEASES!!

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£7

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ADDRESS

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ALL ORDERS DESPATCHED WITHIN 14 DAYS.



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from SPECTRUM

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● For up-to-date news, information & offers from SPECTRUM - see PRESTEL page 600181 for full details.

Spectrum GIFT VOUCHERS

● Not sure what to buy? Why not give a SPECTRUM GIFT VOUCHER - available in any value over £5. See your local SPECTRUM dealer NOW!

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SPECTRUM service centres will ensure that should your machine 'go down' we will get it running again as quickly as possible. We also offer extended warranties at reasonable prices too! - ask your SPECTRUM HOME COMPUTER CENTRE for full details

COMPUTER DEALERS

(or prospective Computer dealers!) If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis, please write to MIKE STERN, Spectrum (UK) Ltd., Burrowfield, Welwyn Garden City, Herts. or telephone (07073) 34761

Fantastic Value from Spectrum!

COMMODORE 64

BUSINESS PACKAGE

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OVER



Includes:

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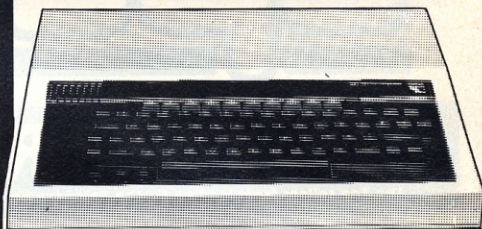
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BBC



Model B Micro

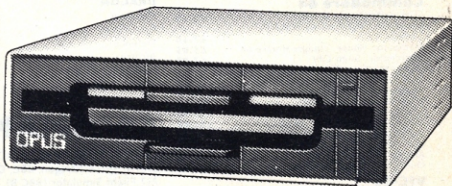
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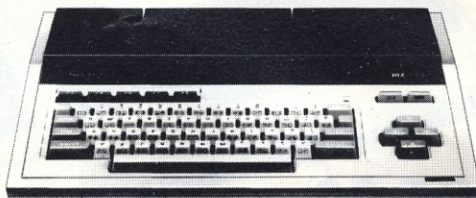
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(MZ-700 Series Computer)



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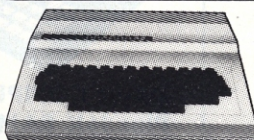
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DRAGON



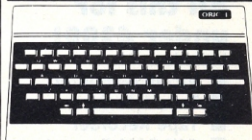
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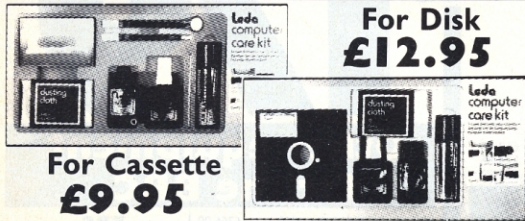
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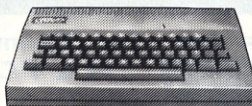
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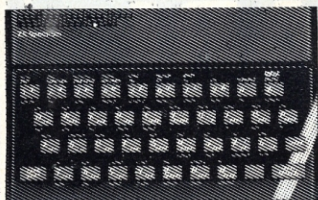
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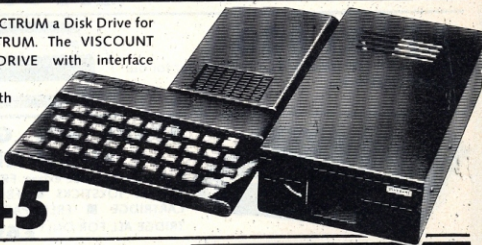
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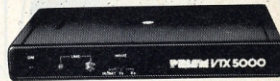
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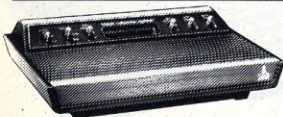
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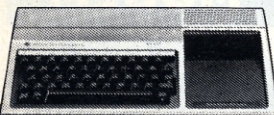


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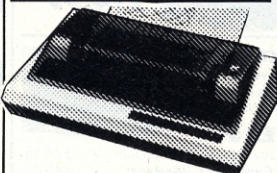
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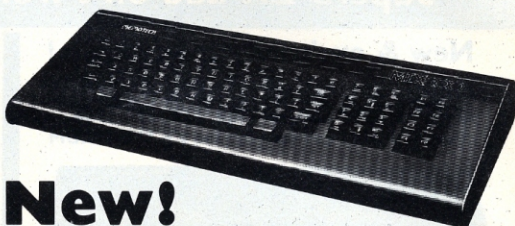
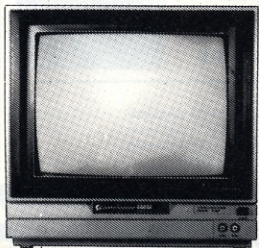


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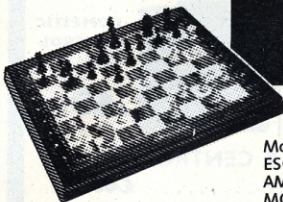
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Debugging Oric PRINTING

There seem to be three ways of overcoming the Oric LPRINT and PRINT TAB 'bug'.

The location 48 contains the print position but is cleared to 13 each time instead of 0. Thus, if one POKEs 48,0 before each TAB, the position should be correct.

A second method is to use SPC instead of TAB. Often a simple SPC(N) is sufficient, but for an equivalent to PRINTAN(N) AS, use PRINT SPC(N-POS(0)) AS.

A third method is to POKE 617 with the required position plus 2 (you have to add two, as the screen printing position starts in column 2 not column 0). Now POKE617, N+2: PRINT AS is equivalent to PRINT TAB(N)AS.

The biggest complication arises, however, when it is necessary to have two or more TABs per line. The POKE & 30 method will not work for PRINT, but it is the only method that does work for LPRINT. On the other hand, the line PRINTSPC (N1-POS(0))AS:SPC(N2-POS(0))BS:SPC(N3-POS(0))CS; etc works. The POKE 617 method is not satisfactory for either PRINT or LPRINT.

John A Green,
Bolton Computer Club,
Leigh, Lancs

No scroll area on Oric screen

Here is a handy way of producing scroll protection on the Oric. To prevent upper portions of the screen from scrolling:

```
POKE#26F,27-(number of lines to be protected)
DOKE#26D,48000+(40*the
```

number of lines to be protected)

The POKE and DOKE are paired and must always be done as a pair, otherwise strange things will happen to the display. To restore to normal:

```
POKE#26F,27
DOKE#26D,48000
```

To prevent the lower portions of the screen from scrolling use #26F only.

```
POKE#26F,27-(the number of lines to be protected).
```

P A Lockerby,
Nelson, Lancs

Take a BREAK with your Lynx

The following program for the Lynx can be used to determine whether the BREAK key is pressed. This key is not used by the normal keyboard routine, but is connected to the Z80's maskable interrupt. Unfortunately, the video chip also causes an interrupt, so this program times the interval between the two interrupts to determine the cause of the interrupt.

```
To use the program, first enter DPOKE&6297, &4DED.
```

The routine is called by CALL LCTN (100). The variable HL will be set by the routine, to 1, if the break key is depressed, to 0, otherwise. The routine itself is:

```
100 CODE ED 56 FB 76 AF
67 6F ED 4F FB 76 ED 5F FE
30 F0 2C C9
```

D P Akerman,
Coundon, Coventry.

Restoration without OLD

The Lynx lacks an OLD command to restore a program after it has been NEWed. For simple programs, POKE & 694D, & CO is successful, but will not work if a program needs to be edited or contains arrays. This is because the end of Basic pointer at & 61FC is set to start of Basic (& 694D) after NEW.

The procedure to use is:

1. Find the end of Basic marker, by calling up MONITOR, W 694D 8080
2. Take note of the first location number in the listing eg & 895F (it must be less than HIMEM, & 9FF8)
3. Return to Basic with the J command.
4. Reset the end of Basic pointer with the location from

instruction 2 by using:

```
DPOKE & 61FC, & 895F
5. Remove the new end of Basic marker at & 694D and replace it with & CO. POKE & 694D, & CO
```

The program will now run satisfactorily. The first line of the restored Basic program will be renumbered to 1 by instruction 5 but can be edited in the normal manner by Control E.

R Towers,
Hamilton, Scotland

Quick access to CBM64 control codes

Many Commodore owners may not realise that the control key can be used with the alphabetic keys to produce the CHR\$ codes one to twenty six.

```
ie 'CTRL' and 'A' = CHR$(1)
'CTRL' and 'B' = CHR$(2)
etc.
```

These controls may either be used in direct mode, or printed within quotes in a program.

David Gristwood,
Sunderland, Tyne and Wear.

Foolproof Oric ink and paper

There is a popular method of doing a hard reset on the Oric; the call is to #EA59, but try this if you have set the INK or PAPER colours and the machine crashes. A much more foolproof location is #F426. This waits for a few seconds, then performs a hard reset no matter what the screen colour is. Note that any defined characters will revert back to their old selves.

James Eibisch,
Cheltenham, Glos

Oric INVERSE substitute routine

Try the following routine as a substitute for INVERSE on the Oric.

```
10FOR A=46336 TO 46343
20POKEA,127:NEXT A
30FOR B=48000 TO 48039
40POKE B,0:NEXT B
50FOR C=46344 TO 46351
60POKEC,0:NEXT C
```

Lines 10 and 20 define space as a solid block of foreground colour. As the Oric screen is made up (except for the two left hand columns) of a series of spaces, it displays in foreground colour.

Printing, or plotting, on the screen maintains the character in its foreground colour,

but still on a block of (old) background colour.

The routine is most effective when the background is black, as the two left-hand columns merge with the border.

Lines 30 to 40 obliterate the status line. Lines 50 to 60 redefine ! as a solid block of (old) background colour, so that the window effect may be preserved.

David Harrison,
Wirral, Merseyside.

Oric user achieves the 'impossible'

Did you know that it is possible to draw off the Oric screen, without receiving a syntax error. Try the following:

```
10 HIRE$
20 CURSET 238,199,1
30 CIRCLE 127,1
```

This is only one example, experiment for other effects.

The following routine is very handy for impressing people with the double height facility of the Oric. It side scrolls the line and is very effective for titles and the like.

```
10CLS:PAPER4:INK0
20A#="PERSONAL
COMPUTER NEWS IS
THE BEST"
30DOKE#26B,#010A
40CLS
50PLOT0,10,17:PLOT0
13,17
60PLOT0,11,LEFT$(A,38)
70PLOT0,12,LEFT$(A$,38)
80A$=MID$(A$,2)+LEFT$(
A$,1)
90WAIT 10
100GOTO 60
Anthony O'Dawd,
Dublin, Ireland
```

Shrinking your Newbrain

Here is an interesting way of decreasing the size of the Newbrain screen. To change the width use:

```
Set X=PEEK(92)+PEEK(93)*256
```

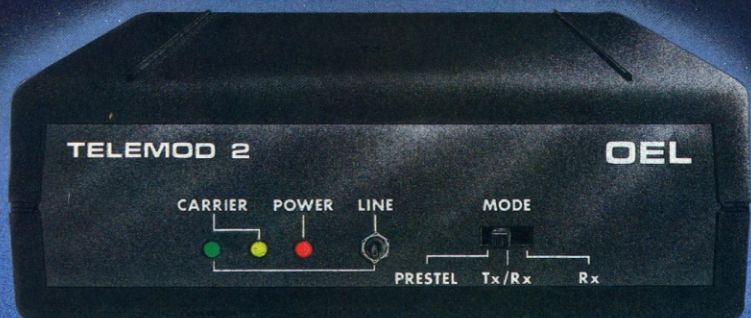
then to change the width: POKE X+5, width required and to change the depth: POKE X+4, depth required

The following program will halve the dimensions of the screen:

```
10X=PEEK(92)+PEEK(93)*256
20POKE X+5,20:
POKE X+4,12
30END
```

David Waterson,
London SW

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Will the Adam initiate a price revolution? Brian Power investigates Coleco's industry-shaker.

The Eve of Adam

A lot of computer makers talk about giving you more for your money. Every month there is yet another system hustled onto the market with promises of a larger memory and more power—all for a smaller investment.

Coleco is basing its much-publicised new Adam on that premise. This computer is offered at such a radically lower price that the industry is watching to see if Adam can live up to its advance billing.

What makes this computer so different is that the entire system, including a letter-quality printer, will sell for just \$700 in the US. (U.K. price is expected to be about £700). You would expect that kind of a

price breakthrough from one of the larger American companies such as Apple or IBM. But Coleco? Isn't it best known for its toys and games?

The company isn't talking much about how it managed such a coup. But the vertically-integrated company was able to develop its own printer and tape drive and other new technology such as simpler motors. You end up with 80K of internal memory, a full keyboard, a good mass-storage tape system, built-in word processing and a letter-quality printer in the basic system. Here's how the Adam is put together.

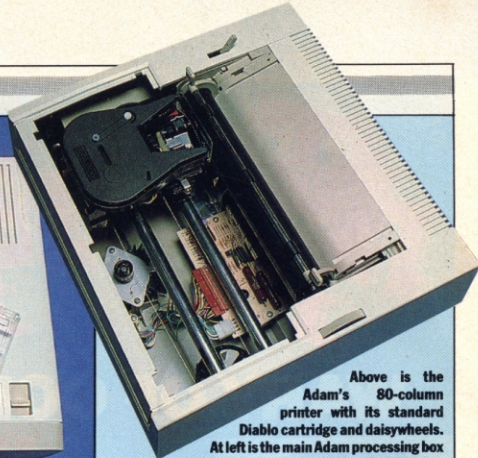
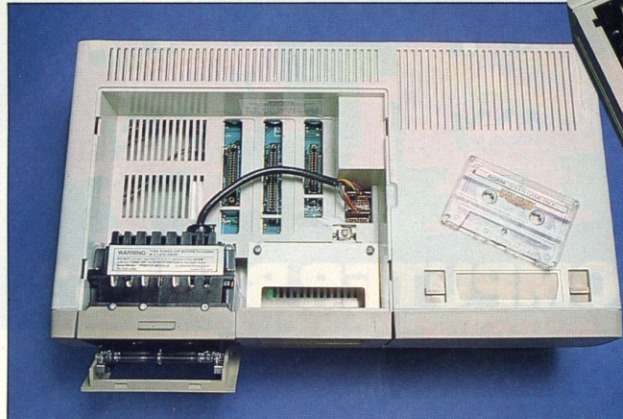
Presentation

Coleco obviously knew that Adam will go into the homes of a lot of first-time computer buyers, and the machine had to inspire confidence just sitting in the box. It does. Blessed by the fact that the computer connects to the television set, Coleco can package the Adam without a monitor and make for a more compact unit.

The whole thing comes in one 40-pound box that one average adult could wrestle in and out of taxis and even through train stations, if it had to come to that. The Adam is smartly, and safely, packaged inside a bright box. I have seen them cause



Deborah MacNeill



Above is the Adam's 80-column printer with its standard Diablo cartridge and daisywheels. At left is the main Adam processing box with cartridge software slot (bottom right), floppy cassette tape drive (bottom left) and plug-ins for further expansion (they are the slots pictured above the tape drive).

a real stir among air travellers as they spun round the baggage sections at a major airport.

Documentation

The Adam comes with three books, a 64-page set-up manual and two larger binders for word processing and programming in BASIC. You can see the way Coleco rushed the Adam onto the market by the fact that pages in the word processing book have newly-written instructions glued over the old ones.

It is obvious that Coleco expects some Adam buyers will never get beyond the set-up manual. That manual contains enough information for simple word processing so that you don't really need the more extensive binder. It also tells readers that programming is a hobby like sewing or carpentry, and they don't have to bother learning it if they don't want to.

This set-up manual is a welcome change to many instruction books — it is actually easy to follow. A no-nonsense book that doesn't pander to the novice, it contains simple instructions and plenty of clear

photos that take you from unpacking the box to changing the printer ribbon. The on-screen help menus are extensive enough to get you going without the manual once Adam is taken out of the box and plugged in.

Construction

We now move into the heart of the matter. Coleco has created Adam from three main components, the memory console, the keyboard and the printer. The console includes the system's Z80A microprocessor, meaning compatibility with the CP/M operating system, the RAM and a high-speed tape drive.

The microprocessor addresses 64K of RAM but the computer also contains a separate processor for the video display that includes an additional 16K of memory just for graphics, bringing the total to 80K. Another 64K of RAM is available as an option, bringing the total up to 144K.

The sculptured keyboard has 75 keys, including six programmable function 'smart keys' that correspond with six labelled boxes on the screen. The

keyboard has the feel of more expensive systems and I give it a good rating.

Coleco was thinking of word processing when it designed the keyboard, including keys such as *insert*, *delete*, *move/copy* and *store/get* to provide quick access to specific word processing functions. In addition to ten command keys, there are cursor arrow keys.

Two game controllers come with it. While they are primarily for playing games, one of them can be attached to the keyboard to move the cursor, as an alternative to the arrow keys, and can also be used for entering numbers.

The keyboard and printer have separate microprocessors, and a communications system Coleco calls Adamnet ties the whole thing together. It is enough to allow the computer to do simple multi-tasking.

Screen

The screen for the Adam is likely to be your own television set. It had better be colour or you will miss a lot of what Adam offers. During some operations the screen contains four different sections, with four different colours.

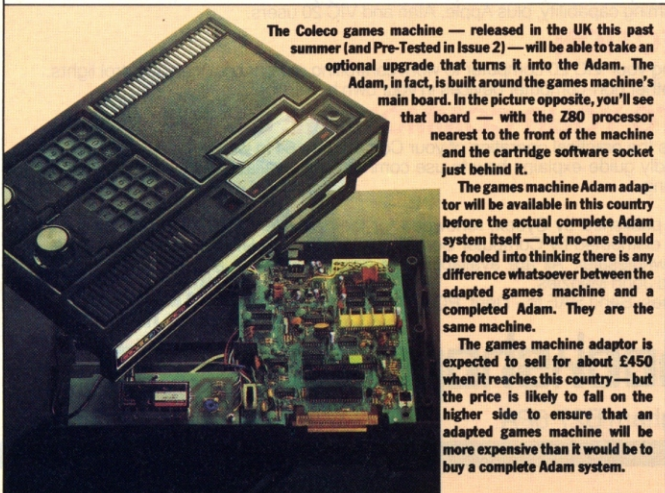
The screen is set up to convince you that working on Adam is no different than typing on a typewriter. I wish computer makers wouldn't bother because the screen is going to start looking tedious once you get used to the system.

There are graduated markers up the left side and across the top of the screen, to set the margins for a printout. There is a band of six blue boxes across the bottom of the screen that correspond to the 'smart keys.' Above that is a roller, shaped like a typewriter roller, which you write into. After writing two lines, the lines begin rolling up the screen.

If it sounds cluttered, it is. There isn't much room on the screen for your work by this point. Coleco is assuming you are incapable of thinking for yourself and need to be shown everything.

Storage

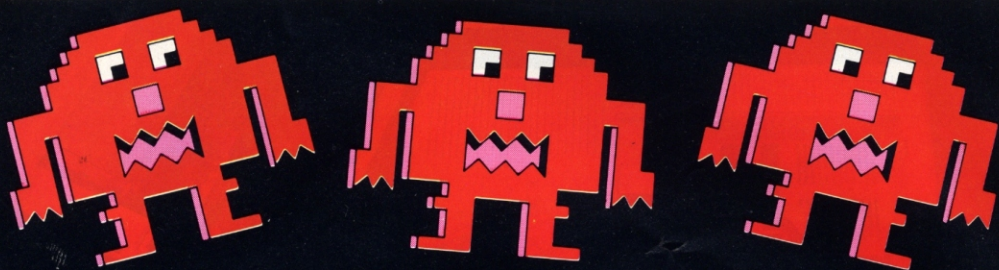
A lot of people prefer the faster and more reliable disk drives to tape cassette storage. But Coleco has got around that, and



The Coleco games machine — released in the UK this past summer (and Pre-Tested in Issue 2) — will be able to take an optional upgrade that turns it into the Adam. The Adam, in fact, is built around the games machine's main board. In the picture opposite, you'll see that board — with the Z80 processor nearest to the front of the machine and the cartridge software socket just behind it.

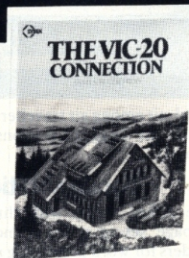
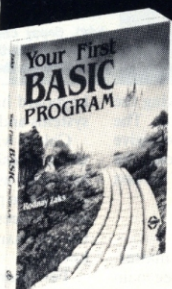
The games machine Adam adaptor will be available in this country before the actual complete Adam system itself — but no-one should be fooled into thinking there is any difference whatsoever between the adapted games machine and a completed Adam. They are the same machine.

The games machine adaptor is expected to sell for about £450 when it reaches this country — but the price is likely to fall on the higher side to ensure that an adapted games machine will be more expensive than it would be to buy a complete Adam system.



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lowered the cost of Adam, by developing a high speed tape system with a transfer rate to the microprocessor of 19.2K bits per second — eight to 16 times faster than other cassette systems. While it was still slower than a floppy disk, I found it worked quickly and transferred the information without any problems.

The closed-loop bidirectional tape is preformatted to hold 500K of information (about 250 pages of text). Information is stored sequentially on the tape, with the initial information stored in the middle of the tape and later files added on either side.

Printer

So far I have been fairly positive in detailing Adam, but when it comes to the printer I begin to worry. By advertising Adam as a complete system, it could live or die if the printer doesn't hold up.

To be positive, a lot of letter-quality printers alone cost as much as Adam. Coleco has developed an 80-column bidirectional printer with a 91/2-inch carriage that uses standard Diablo daisy wheels, allowing you to choose your type face, as well as standard ribbon cartridges.

For the price, I suppose I could live with the 120 words per minute speed, although it seems painfully slow.

But here's the rub. Most of the printer is made of a hardened plastic and doesn't look all that sturdy. I have doubts that it could run well for any length of time. It looks like a small child could do a lot of damage quickly. Coleco swears it has tested the printer extensively, but I couldn't help wondering how well the printer could stand up to six months or a year of printing.

Expansion

The entire Adam can be an expansion module, so to speak. You can buy a stepped-down version of the Adam which allows you to fit your ColecoVision video game system into the memory console.

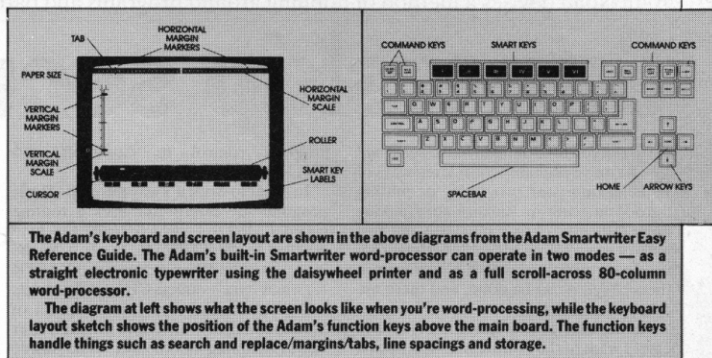
Coleco plans to introduce an expansion module early next year, which will contain a floppy disk drive and an 80-column card for those who are going to do more serious work. It will sell for \$300 in the US.

Adam has four expansion slots, three for peripheral cards and one for the upcoming expansion module. The slots can be used for such options as the 80-column card, Coleco's steering wheel for its turbo game or an adapter for Atari 2600 game cartridges.

At this point, none of these are available. Last summer they expected the expansion module ready by the end of the year, but that has obviously proved too optimistic.

Software

In most systems the word processing package comes on a separate cartridge or disk, but on Adam the Smartwriter word processing program is built right into its ROM. Turn on the computer and it is automatically in a typewriter mode, where every letter you strike on the keyboard is typed onto the printer.



A keystroke switches to the word processing program, which offers on-screen correction, deletion and text-searching. It highlights the text to be moved or deleted. It has an *undo* key to retrieve material if you change your mind or have made a mistake.

Adam has only 36 columns, which is hardly adequate if you are going to write often. Adam has several ways around this. There is a scrolling function that lets you move a window back and forth. A modelling function simulates the 80-column format by showing only the characters near the margins. In a word, they seem clumsy and an inadequate replacement for a wider character display.

The computer comes with two data pack tapes, the Smartbasic language and the Buck Rogers — The Planet of Zoom game, a product much more sophisticated than the game currently available on ROM cartridges.

Smartbasic's source code is compatible with most Applesoft Basic statements. While most programs written in Applesoft Basic will run on Adam, there are differences in the use of PEEK, POKE and CALL commands.

Coleco is currently working with software companies to convert some CP/M programs to the Adam tape system. It remains to be seen just how many software developers will convert their systems, although a disk drive module would probably increase the number.

Coleco isn't waiting. It is developing a Smartwriter database management program, to be released early next year, to

manage spreadsheet analysis, telephone directories and personal planning diaries.

Verdict

Coleco has set a rock-bottom price for the Adam system, but this puts the whole system out on a limb if one section such as the printer doesn't work.

I think Coleco is going to have to prove that its printer is really sturdier than it looks. I would like to see it used for six months before I am convinced it can stay the distance.

Also, why put all this emphasis on word processing and then make a system with 36 character lines. It doesn't make sense. The moving window that lets you scroll across the width of the line doesn't impress me as any kind of practical alternative. I think a lot of people who plan to write more than two letters a week to Aunt Millie are going to want the 80-character upgrade — and will have to pay more for it.

Yet in the end, providing the printer holds up and you can use 80-character lines, I think the Adam is a welcome addition. At the very least, if it sells heavily it is going to force the price of other computers down.

PRICES

Main unit including cassette drive, printer and computer unit **\$700 US**
 Anticipated price for floppy disk and 80-column card **\$300 US**
 Anticipated price for Adam conversion unit for Coleco games machine **\$500 US**

SPECIFICATION

Price \$700 US
Processor Z80
RAM 80K
ROM 32K
Text screen 36x24
Graphics Screen same as Coleco's high-resolution games machine
Storage Cassette tape digital data pack — 500K formatted storage per tape — (included with machine) and optional disk drives available in future
Interfaces Daisywheel printer included with machine using non-standard (for disks drives, 80-column cards and others)
OS/Language Coleco's SmartBasic
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John Noad devises a method of hopping around programs and baffling inquisitive intruders.

Superskip security

Have you ever thought about security? You've probably considered ways of locking your programs, or putting the odd mug-trap in. But instead of making them difficult to break into, why not just make it practically impossible for unauthorised eyes to understand what's going on in them? Well it can be done, and there are other advantages.

At the risk of teaching my granny to suck eggs, I want to start with a brief description of what I call the 'Line Header Blocks' used by the Apple when storing Basic programs.

If you've ever delved into the make-up of a Basic program, as stored in RAM, then you will know that each line of a program has its own 'header block' which is four bytes long:

BYTE 1 carries the low byte of the starting address of the next header block

BYTE 2 carries the high byte of same

BYTE 3 carries the low byte of the number of the current line

BYTE 4 carries the high byte of same

So whenever a GOSUB or GOTO command is processed in a program the computer must search through every header block, starting from the beginning of the program (pointed to by TEXTTAB at \$67 and \$68) until it finds one with the target line number in bytes 3 and 4. It is able to do this fairly quickly because it can jump directly from block to block using the information in bytes 1 and 2.

I've already mentioned the use of one pair of zero page locations — at \$67 and \$68. Now I want to introduce an even more delightful couple who reside at \$B8 and \$B9, known to the Apple as TXTPTR.

Even if you know nothing about how a computer works it will be obvious that it must be keeping track of its whereabouts at any given point during the RUNNING of a program. In fact it does this in the Apple by constantly updating the contents of \$B8 and \$B9, which hold the address of each byte in the program as it is fed to the interpreter. But, and this is the important bit, the computer doesn't care what addresses TXTPTR checks out as long as the interpreter keeps receiving valid information. Thus it is theoretically possible to fill \$B8 and \$B9 with any pair of numbers you like as long as you meet that last condition.

Perhaps because I don't use much machine code on my own programs, it was some time before I realised that if Applesoft was inactive, then TXTPTR would remain static and could be changed at will. Obviously all I had to do was to CALL a machine code routine to do the job for me.

The point is that machine code routines don't need a program point as they don't use the interpreter. So when Basic executes a CALL the contents of TXTPTR will be preserved until an RTS returns

program control to Applesoft and TXTPTR goes back to work.

In order to work it's way through a Basic program the interpreter uses a routine called CHRGET, which reads the byte pointed to by TXTPTR, feeds it to the interpreter, and then increments TXTPTR for a new byte — unless CHRGET collects a 0 (End of Line byte) or a : (End of Statement byte). In either of the latter cases (assuming that the 0 or : is not inside inverted commas), CHRGET halts while the last statement is executed. This means that when a machine code routine is CALLED, TXTPTR is left pointing at the zero or colon following the CALL.

```
#0300:A5 B8 LDA $B8 ;Store
TXTPTR low byte at $08

#0302:85 08 STA $08 ;(becomes
RETURN address low byte for second
CALL)

#0304:A5 B9 LDA $B9 ;Store
TXTPTR high byte at $09

#0306:85 09 STA $09 ;(becomes
RETURN address high byte for second
CALL)

#0308:A5 06 LDA $06 ;Transfer
POKEd target address low byte

#030A:85 B8 STA $B8 ;to TXTPTR
low byte

#030C:A5 07 LDA $07 ;Transfer
POKEd target address high byte

#030E:85 B9 STA $B9 ;to TXTPTR
high byte

#0310:A5 08 LDA $08 ;Store old
TXTPTR low byte at $06

#0312:85 06 STA $06 ;for RETURN
if wanted

#0314:A5 09 LDA $09 ;Store old
TXTPTR high byte at $07

#0316:85 07 STA $07 ;for RETURN
if wanted

#0318:60 RTS ;Return to
BASIC
```

Superskip GOS TO places other programs cannot reach.

So what happens when the machine code routine ends — when it reaches RTS? Well it seems (from my experiments) that TXTPTR it first incremented and then CHRGET goes back to work. In other words, when you alter TXTPTR it must point to the byte *preceding* the statement you are jumping to, though it can safely 'return' to the byte it was sent from.

Superskip uses three commands — two POKEs and a CALL. If you want to unskip — the equivalent of RETURNing from a GOSUB — then only the CALL is needed. In both cases the same location — 768 — is CALLED (unless you wish to relocate the routine). What the routine does is to move four pieces of information around like this:

Stage 1 the current value in the low byte of TXTPTR is moved to \$08, and the high byte to \$09

Stage 2 the values that you POKEd into \$06 (low byte) and \$07 (high byte) are transferred to TXTPTR so that it now points at the target statement

Stage 3 the old values of TXTPTR are moved down from \$08 and \$09 to allow a RETURN if it is wanted.

In Basic terms, we would have written GOSUB or GOTO (or THEN) we must now write POKe 6, (target address low byte): POKe 7, (target address high byte): CALL 768. Where we would have written RETURN we now write CALL 768 only. And where no RETURN is required then, as in Basic, we write nothing at all.

I've boiled Superskip down to 5 steps:

- (1) Enter the entire program as normal with all GOSUB/GOTO/THEN statements in place (making sure that they are *not* nested) and get a listing. It might be easier to use Superskip if all sub-routines are collected at the end of the program, but it certainly isn't essential.
- (2) Working through from the start of the program replace each GOSUB/GOTO/THEN with POKe 6,000 : POKe 7,000 : CALL 768. Replace each RETURN with CALL 768.

- (3) Working through the target statements in the order in which they are accessed replace the target statement with PRINT PEEK(184) and RUN the line. Now deduct 8 from the result and place the result in the appropriate POKe 6,000 statement (leading zeros will be ignored when the POKe is executed). Go to step (4) before repeating step (3).

Note: What you are doing here is reading the low byte of TXTPTR. Deducting 8 takes you back to the byte before PRINT.

- (4) Repeat step (3), but this time alter PEEK(184) to PEEK(185). Unless your program is very long (more than 23 000 bytes) the result of this PEEK is unlikely to be more than two digits. The result of PEEK(185) will give you the high byte of TXTPTR. However, if the result of step (3) was 7 or less then deduct 1 from the result of step (4) before placing it in the appropriate POKe 7,000 statement. Go to step (5) before repeating step (3).
- (5) Replace the PRINT PEEK(185) command with the original program statement and return to step (3) if required.

Remember, you don't need to keep track of 'return' address as Superskip is already equipped to deal with this.

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Write your own Newbrain software; Chris Rust introduces us to a word processor package.

Newbrain Editor

The Newbrain's rescue stresses one thing about the micro — at least one company thinks it has a lot going for it. And in time the support it desperately needs may still arrive.

Unfortunately this may not be of any help to the large numbers who kept Grundy afloat for so long by buying the Newbrain as a home computer. Most of them have despaired of ever seeing the vast range of cheap software that competing machines can offer.

So writing your own software seems to be the best course.

This series of articles will help those of you who are still determined to master one of the most interesting and flexible computers on the market. Over the next few weeks it will provide a step by step guide to the development of a word processing program which uses many of the interesting features of the Newbrain.

By the end of the series you will have a useful piece of software, tailored to your own needs. You will also have a much better understanding of the technical features of the Newbrain, which should help you write more effective programs for games, education, business and science.

Why a word processor?

The Newbrain screen editor is so good that word processing can be done with a relatively simple program. So we can concentrate on the special features of the machine and tailoring the program without too much mind-crunching detail.

The program will be based on a cassette-based one which I wrote for my own use a few months ago. Since then I have used it for correspondence, technical reports, records, notekeeping and business paperwork. Naturally I am using it to write this article.

Can you afford it?

One accessory that you'll need sooner or later is a printer. I use the Radio Shack CGP-115 four pen printer/plotter, which costs £150 from any Tandyshop. It writes in four colours and 64 text sizes, and can produce line drawings with real pens. The manual, unlike the Newbrain's, is delightfully clear. Unlike many dot-matrix printers, it photocopies well.

The only drawback is the paper width. At 115mm it is about half what you expect. However there are ways round that, so don't be put off what is otherwise a tremendous bargain.

If you have a different printer, don't worry, the program will still work for you.

When developing a program the first move should be to work out the structure. This program must be compact, because without a disk drive, every byte of extra Basic cuts down the space for text.

Setting up routines

CLOSE STREAMS

Close any devices left open by previous programs

```
99 REM CLOSE STREAMS *****
100 FORa=1to255:CLOSEa:NEXTa
```

CONSTANTS

Line 1000 gives names to keyboard, printer and tape stream numbers. It also names constants for all the main screen editor codes. These are described in detail in Appendix 3 of the NewBrain manual.

```
999 REM DECLARE CONSTANTS *****
1000 ky=105:pr=106:lp=101:rd=5:cu=6:cb=2
:lt=8:hm=12:cr=13:n=17:st=18:sc=19:rc=2
0:yx=21:xy=22:rt=26:es=27:hl=28:bl=30:cl=31
1010 ll=60:cc=40:ss=5:ll=3:mt=7
```

Line 1010 specifies page format:

ll = No of lines per page
cc = No of columns per line
ss = No of screens
mt is required by the menu routines which are not covered in this article.

STRING CONSTANTS

Largely self explanatory, in\$ is a row of 40 x chr\$(129). To enter it, type Graphics/A 40 times and you should have a horizontal line the full width of the screen. The array of control strings, sp\$(0-3), has several graphics characters which will not print out in the listings. The asterisks are a temporary measure. I will explain the construction of each string as we bring it into use.

```
1099 REM STRING CONSTANTS *****
1100 in$=""
```

```
1110 mu$(1)="Edit page"
1111 mu$(2)="Load from tape"
1112 mu$(3)="Save to tape"
1113 mu$(4)="Print out"
1114 mu$(5)="Cut and Paste"
1120 pi$(0)="What next?"
1121 pi$(1)="TO page No : "
1122 pi$(2)="FROM page No : "
1123 pi$(3)="Set up Tape"
1124 pi$(4)="Play Tape"
1125 pi$(5)="ok?"
1126 pi$(6)="Another Page?"
1160 sp$(0)="*"
1161 sp$(1)="*****"REM elsepc
1162 sp$(2)="*****"REM bl,0-9
:left,right,newline,escape
```

OPEN UP

Open keyboard input device on stream ky
Open 600 baud printer stream (stream pr)
Open 24 line x 40 column text screen on stream 0 (default display)
Note: 600 baud is the rate for my printer. If yours is different enter the right value between the quotation marks

```
1199 REM OPEN UP *****
1200 OPEN#ky,5:OPEN#pr,8:600:OPEN#0,0:RET
```

SCREENS

Open screens 1 to ss with subroutine SCREEN.
RET

```
8999 REM SCREENS *****
9000 FORt=1TOss:GOSUB9100:NEXTt:RET
```

SCREEN

Close TARGET screen tg.
Open 50 line x 40 column text screen on TARGET stream using stream number as port number.
Print Header to screen with FORMAT
RET

```
9099 REM SCREEN *****
9100 CLOSE#tg:OPEN#tg,0,t,"60":GOSUB9200:RET
```

FORMAT

Set page title pg\$(tg) as blank line with page number at left hand end.
Print line in\$ below title.
RET

```
9199 REM FORMAT *****
9200 pg$(tg)=MIN$(STR$(tg),2,LEN$(str$(tg))-2)+CHR$(46):PUT#tg,cl:GOSUB9400:?#tg,in$:PUT#tg,cu:RET
```

PAGE TITLE

Place cursor at home position on TARGET screen
Print Page Title pg\$(tg)
RET

```
9399 REM PAGE TITLE *****
9400 PUT#tg,hm,bl:?#tg,pg$(tg):RET
```

The screen editor can do most of the donkey work of manipulating text, so you don't have to worry about formatting or special editing routines. Text storage is

also very easy on the Newbrain. You can set up a number of duplicate screens or pages and flip between them at will. All of the text will be stored on screen displays.

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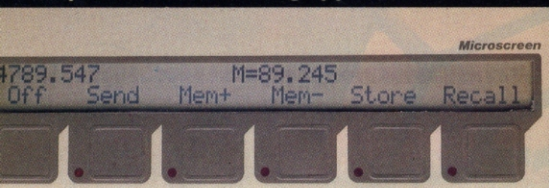
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Editor routines

EDITOR	
Position cursor at top left of screen to Set flag m1 for TRAPKEY Get keystroke from KEYBOARD Check with TRAPKEY for special function If key pressed was ESCAPE then RET Use TRAPKEY flag, m3, to select action Restart at "Get keystroke" (lines 3000-3040 don't concern us just yet)	2999 REM EDITOR ***** 3050 PUT#tg,xy,1,3:m1=FALSE 3060 GOSUB20000:GOSUB20100:IFk=esTHENGO SUB22100:RET 3070 ONm3GOSUB20200,21000,21100:GOTO3060
KEYBOARD	
Wait for keystroke When key pressed set variable ks to ASC number of keystroke and RET	19999 REM KEYBOARD ***** 20000 GET#y,ks:RET
TRAPKEY	
Compare keystroke ks with control string sp\$(m1) If ks calls for special action set flag m3 to routing number. This flag tells EDITOR which subroutine to use If no special action called for set m3 to 1 RET	20099 REM TRAPKEY ***** 20100 m3=INSTR(sp\$(m1),CHR*(ks+40))+1:RE T
PUTKEY	
Execute keystroke ks on TARGET device to RET	20199 REM PUTKEY ***** 20200 PUT#tg,ks:RET
NEWLINE	
Send carriage return to TARGET device to Follow with home left code to cancel unwanted effects of carriage return RET	20999 REM NEWLINE ***** 21000 PUT#tg,cr,hl:RET
IGNORE	
Take no action on this keystroke RET	21099 REM IGNORE ***** 21100 RET
READ TITLE	
Don't ask awkward questions; just type it in and I will explain later.	22099 REM READ TITLE ***** 22100 RET

FOR
a = ITO10:GET#105,b:PUTb:
NEXTa

The cursor will disappear. Press a few
keys and see the letters appear. After ten
keystrokes, execution will end and the
cursor reappears. Now try this:

```
PUT6 : FORa#1TO10 : GET#105,b :
PUTb+2:NEXTa:PUT7
```

and you have an editor which displays a
cursor and modifies text. Where will it
end?

By now you should be able to make some
sense of most of the listing. There is one
routine, essential to the Editor, left to
explain.

Trapkey

A modified screen editor needs a way to
recognise the keystrokes which need
special treatment. Trapkey uses the string
handling function INSTR to find if and
where a keystroke comes in a list of special
keystrokes.

The list is contained in the string
sp\$(m1). Each character represents one
keystroke, its ASCII number is the ASCII
number of the keystroke plus 40. (We
cannot use the actual ASCII number as
some characters in the control code set
below 31 will not SAVE or LIST very
easily.)

Editor instructs Trapkey to use sp\$(0),
which traps control codes 13 (newline) and
31 (shift/home). We will add other special
functions later.

The string is an easy one to enter. On line
1160 of the listing, where the string is
shown as "***" enter "SG" instead.

The special routines modify Newline to
avoid deleting the line below. They also
ensure that Shift/Home, which clears the
page, is ignored. You can probably see the
potential of this function for sophisticated
text editing.

The listing

Obviously the listing published here is
incomplete. It lacks the menu and text
handling functions which we will look at in
later articles.

But you can still get it into limited
operation. Insert a temporary END line
after setting up routines. If you now RUN
it, the program will do all the setting up
needed for Editor to function.

To use Editor you must set the stream
flags tg and pg to the page number which
you require. You can then GOSUB to the
Editor thus:

```
tg=1:pg=1:gosub3050
```

This will display screen 1 and allow you
to type merrily away until you get bored
and press Escape, which causes Editor to
RETURN. In this case RETURN will
jump out of the program and you will be
back in charge.

If you are too impatient to wait for the
next instalment you could try adding a few
extra functions to Editor by extending
sp\$(0) and writing some more subroutines.
Alternatively, see if you can get Editor to
run the printer as a typewriter. You might
learn a bit about your printer which will
come in useful later.

426

The only need to convert text to strings is
to communicate with an outside device
(tape or printer), or use cut and paste to
shunt text about. The program will be
modular, so each routine will perform one
simple job and be as flexible as possible.

This is a good way to get trouble-free
programs and avoid those sprawling,
untidy flowcharts.

The Newbrain offers a simple system of
setting up multiple screens, and gives easy
access to the screen editor. These features
are the foundation of this project.

The program will set up a number of
pages, from one large sheet to 400 record
cards. You'll be able to type on each page
with full correction an editing and you'll
also be able to move text between pages
and shuffle paragraphs.

Screens

The normal screen which is available when
you plug in your Newbrain is a simple 40
column x 24 line display. We will be using
this, unmodified, to display an index and
menu.

To open an additional screen you must
specify a stream number, device type, port
number and screen size eg:
OPEN#0,1,"L50"

The first number 1 is the stream number
— an identifying number which you will
use to specify that screen when you want
access to it later.

The zero is the device number, and
device 0 is a screen display. We could have

specified another device such as the printer
output (device B) in which case stream 1
would be the printer port number.

The second number 1 is the port
number. Specify it whenever you open
more than one device of a type. Port and
stream numbers can be any whole number
between 1 and 255. Each device that you
open must have unique port and stream
numbers.

Editor

If you try to open a few text screens by this
method you will find that nothing happens.
This is because the Newbrain, which
knows what it likes, always reverts to the
default screen on stream 0 unless execution
continues.

But the screen is open; to have a look try
this:

```
PRINT#1,"TEST":FORa = ITO1000:
```

```
NEXTa
```

You will now get your first glimpse of a
duplicate text screen. A PRINT or PUT
command which specifies a duplicate
screen will display that screen until another
screen is used or execution ends.

That is one half of the function of the
Editor, to display the screen and add to or
change it. The other job is to receive
commands from the user via the keyboard.

There are two keyboard devices, 5 and 6.
Device 6 is a bit tricky so we will stick with 5
for now. Open it thus:

```
CLOSE#105:OPEN#105,5
```

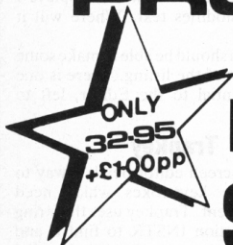
```
Now try this short test:
```


AGF

PROGRAMMABLE JOYSTICK INTERFACE

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or **ZX81**

**MICRODRIVE
COMPATIBLE**



ABOUT OUR INTERFACE

The AGF Programmable Joystick Interface is a unique design offering the use of any Atari-compatible joystick with absolutely all software, whether it is cassette or ROM cartridge, with the Sinclair Spectrum or ZX81.

The hardware programmable interface requires no additional software and accurately replicates the keys of the computer in a manner which is responsive to absolutely ALL key reading methods, both BASIC and Machine Code.

The interface does not interfere with key operation and can therefore be used simultaneously with the keyboard.

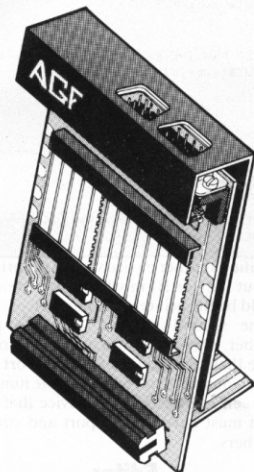
There is no need to remove the interface once fitted as the rear extension connector will accommodate further expansion, i.e. printers or RAM packs etc. This important feature avoids excessive wear to the expansion port.

The key replication principle pioneered by AGF means that your own programs can use eight directional joystick movement by utilising simple key reading BASIC.

Two joystick sockets are provided which share the same keys, for use with the majority of two player games. Several interfaces may be used on the same computer for multiple joystick applications.

The interface is programmed by a two digit code, which is looked up on a programming chart supplied, for each direction and firing button. The two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked on a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface retains the last configuration made and can be immediately used when next switched on.



KEY FEATURES

- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- ★ Rear extension connector for all other add-ons.
- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
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DEALER ENQUIRIES WELCOME		EXPORT PRICES ON APPLICATION	
		FINAL TOTAL	

Not all home computers stay at home.

The BBC Micro is the ideal family computer—simple to operate, yet fast, powerful, with enormous potential.

But it's nice to know, when you buy one for your home, that the business, educational and scientific worlds agree with your choice.

Here are a few stories to illustrate how the BBC Micro gets out and about. And one to remind you how helpful it can be when it stays at home.

A practical lesson in business admin.

The contribution of the BBC Micro in the classroom has long been recognised at Perins Community School in Hampshire.

The School has 12 BBC Micros used extensively across the syllabus: in fact some pupils are using them to study for their GCE O Levels in computing.

One of the programs available to Perins teachers

such as David Beck, pictured below with his class, is "Newsagent."

This program contains all the necessary information for the class to run a newsagent's shop; allowing them to organise daily deliveries, make up bills and keep an eye on stock control and ordering.

It's a nice example of how the BBC Micro can be used not only to acquaint a class with the language of computers, but also with some of the realities of the community in which they live.

Correcting Jodrell Bank.

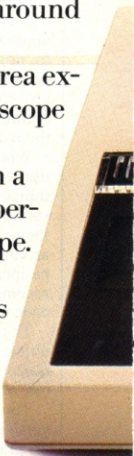
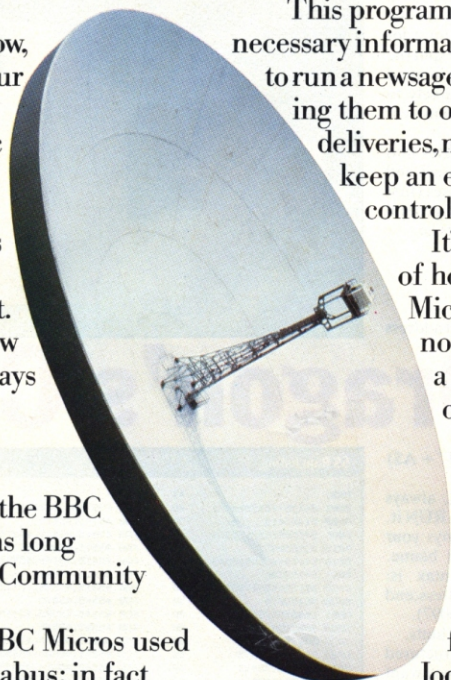
The BBC Micro is a familiar worker around Jodrell Bank.

You'll find it in the reception area explaining the workings of a radio telescope to visitors, for example.

But it's also been helping in a more testing task: to improve the performance of the Defford telescope.

In this application it has been used to make calculations necessary to determine the precise parabolic shape of the dish.

Theodolites are used to do the measuring—then the BBC Micro works out the necessary corrections.



The end of the scrawl.

If any of you have noticed how much easier it is to read and understand labels on drugs and medicines these days, then you can most probably thank the BBC Micro. John Richardson, a Preston pharmacist, was first to realise how a micro with a suitable printer could produce labels that were accurate and legible and which could include, automatically, such information as drug reaction warnings.

At the same time it could record drug usage for better stock control.

He chose the BBC Micro for its versatility and potential for expansion.

John Richardson believes that this system will be recognised as standard in the profession and be used in hospitals, health centres and pharmacies throughout the UK.

Meanwhile back at home.

Dr. & Mrs. Yarwood bought a BBC Micro as a birthday present for their 12 year old daughter.

programs. Mrs. Yarwood is particularly proud of one program she has compiled to help teach her daughter French vocabulary.

They all agree that although the Micro is fast and powerful enough to be at home in Jodrell Bank, it is also the ideal computer at the Yarwood home: simple to set up (virtually any TV set and cassette player is all you need) and simple to use.



All this for only £399.

The BBC Micro comes with a comprehensive, step-by-step User Guide which introduces you to your micro and shows you how to construct useful programs of your own.

You will also receive a free "Welcome" cassette which contains 15 different programs for you to experiment with, ranging from music and graphics to games like Kingdom and Bat 'n' Ball.

The BBC Micro is available from WH Smith Computer Shops, Boots, John Lewis and local Acorn stockists.

Alternatively if you would like to order one with your credit card or if you want the address of your nearest supplier just phone 01-200 0200 or 0933-79300.



However, it quite quickly became common property.

All three can now write their own

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

MICROPUZZLES

PLUS A CHANCE TO WIN A NEW ACT APRICOT!

A new ACT Apricot computer is being offered as first prize in a competition featured in *Micropuzzles*. The prize includes keyboard (with built in micro screen), monitor, dual disk drive system unit offering 630K of storage and full supporting software. Approx total retail value of £3,000.
20 runners-up prizes of annual subscriptions to PERSONAL COMPUTER NEWS.



MICROPUZZLES BY J J CLESSA

The renowned puzzle-master of PERSONAL COMPUTER WORLD'S *Leisure Lines* feature has written a new paperback for the PAN/PCN Computer library to be published on November 11th 1983 at £2.95.

Stretch Your Mind - with more than a little help from your micro to find the answers. Test your mental ability with the Quickie Questions, or tackle the conundrums of the Puzzle Posers. Access the answers if you're baffled.

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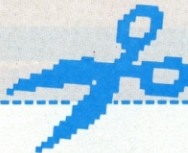
How to enter

You need a copy of *Micropuzzles* to enter the competition, so *fill in the coupon below and send it to Pan Books Ltd, FREEPOST, PO Box 109, 14-26 Baker Street, High Wycombe, Bucks HP11 2TD *or go to your nearest bookshop *or ring 01-200 0200 for immediate 24 hour service and use your credit card.

Full details of the above competition and the rules of entry are available from *Micropuzzles* Competition, Pan Books Ltd, 18-21 Cavaye Place, London SW10 9PG. Offer closes 31st January 1984.

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DRAGON ACTION

433

So it really is better to use tables, which work like arrays in Basic. Their main disadvantage is that they eat up memory, and that when something happens you often have to update all or many of the tables. But now for the big production number you've been waiting for.

Start by clearing memory from &H6000 onwards. You can now type in machine code by your chosen method. Save your code with CSAVEN "NAME", &H6000,

end address, 6097 (this is the start address). Now check that you've got it by typing EXEC6097 — the screen should scroll from right to left.

Try firing, or using the other controls — if it crashes you should go back to the source code, which you've remembered to SAVE, of course, and check for errors.

Once you've got the code working, type in the creator program. Press the cursor keys to move up and down, move the

joystick, and when you have the desired position for the scenery press the space bar. Note that you should always do the top part first and then the lower part, otherwise an FC error occurs. Scramble being Scramble, it should be possible for you to make more stages to the program once you've worked out how it works. And you should also be well on the way to working out your own ideas for other arcade games — happy tapping!

0100	160	WLO	0100	250	WFO1	02A2	170115	310	LBSR @SCROLL		
0100	160	LDA #0	0105	250	CMPA #30	02A5	17020A	310	LBSR @HTS		
010F	070FCC	160	STA WPLAYER-4	250	BHI #01	02AB	17020E	310	LBSR @HERE		
0112	160	WLO	0108	170350	250	LBSR @PULMP	02AE	17020C	310	LBSR @FIRE	
0112	0A00	160	LDA ,Y+	010C	250	WGI	02AE	1702C2	310	RTS	
0114	A20A	100	STA ,X	010E	170064	250	LBSR @PART2	02B1	33	320	WHERE
0116	30B820	100	LEAX 32,X	010F	FC0FBC	250	LDD @PLAYER-20	02B2	33	320	RTS
0119	70F5CC	160	DEC WPLAYER-4	0112	03B001	250	BNE @STAGE2	02B2	33	320	RTS
011C	2674	160	BNE WLO	0115	F0D6FC	250	STD WPLAYER-20	02B2	33	320	RTS
011E	30B9F41	160	LEAX -191,X	0118	26CB	250	SUBD #1	02B2	33	320	RTS
0122	70F5CC	160	DEC WPLAYER-1	011A	CC01F6	250	STD WPLAYER-20	02B2	33	320	RTS
0125	26E6	160	BNE WLO	011C	F0D6FC	250	LDD #WSTAGE3	02B2	33	320	RTS
0127	8E1D0B	170	LDX ##IDFF-148	011E	C01910	260	STD WPLAYER-22	02B2	33	320	RTS
012A	806F	170	LDA #15	011F	C01910	260	LDD #4000	02B2	33	320	RTS
012C	070FCC	170	STA WPLAYER-1	0120	F0D6FC	260	STD WPLAYER-20	02B2	33	320	RTS
012F	4E	170	CLR A	0121	170064	260	WSTAGE3	02B2	33	320	RTS
0130	170	WFO	0121	F0D6FC	260	LBSR @PART1	02B2	33	320	RTS	
0132	C604	170	LDB #4	0123	800113	260	LDA 275	02B2	33	320	RTS
0132	170	WFO1	0123	800113	260	ADD A 240	02B2	33	320	RTS	
0132	A20A	170	STA ,X	0124	2085	260	ANDA #01	02B2	33	320	RTS
0134	30B820	170	LEAX 32,X	0125	8106	260	CMPA #5	02B2	33	320	RTS
0137	5A	170	DECB	0203	2205	260	BHI #K1	02B2	33	320	RTS
0138	26F8	170	BNE WFO1	0205	1702F4	260	LBSR @PMOTOR	02B2	33	320	RTS
013A	30B881	170	LEAX -127,X	0208	2013	260	BRA #0H	02B2	33	320	RTS
013D	70F5CC	170	DEC WPLAYER-1	0208	2013	260	WGI	02B2	33	320	RTS
0140	26EE	170	BNE WFO	0208	2205	260	BHI #K2	02B2	33	320	RTS
0142	8E1D0B	180	SEC 12	020E	1701F4	260	LBSR @HPUT	02B2	33	320	RTS
0145	10B0041	180	LDY #041	0211	2018	260	BRA #0H	02B2	33	320	RTS
0149	6085	180	LDB #5	0213	2018	260	WGI	02B2	33	320	RTS
014B	070FCC	180	STB WPLAYER-1	0213	8128	260	CMPA #40	02B2	33	320	RTS
014E	180	ROUTER1	0215	2205	260	BHI #K3	02B2	33	320	RTS	
014E	180	LDB #3	0217	170312	260	LBSR @PDMUP	02B2	33	320	RTS	
014E	70F5CC	180	STB WPLAYER-4	021A	2087	260	BRA #0H	02B2	33	320	RTS
0153	ECB1	180	LDD ,X++	021C	8120	260	CMPA #45	02B2	33	320	RTS
0155	ED01	180	STD ,Y++	021E	170348	260	BHI #0H	02B2	33	320	RTS
0157	70F5CC	180	DEC WPLAYER-4	0223	170348	270	LBSR @PHTHOMR	02B2	33	320	RTS
015A	26F7	180	BNE #1NER	0223	17006D	270	WGI	02B2	33	320	RTS
015C	31A01A	180	LEAY 26,Y	0223	F0C0FC	270	LBSR @PART2	02B2	33	320	RTS
015F	70F5CC	180	DEC WPLAYER-1	0226	F0C0FC	270	LDD WPLAYER-20	02B2	33	320	RTS
0162	26EA	180	BNE WOUTER1	0229	03B001	270	SUBD #0	02B2	33	320	RTS
0164	190	SCREEN CLEARED AND SET UP	022C	F0E0FC	270	STD WPLAYER-20	02B2	33	320	RTS	
0164	CC1301	200	LDD #1301	022F	26C5	270	BNE WSTAGE3	02B2	33	320	RTS
0167	F0D6FC	200	STD WPLAYER-3	0231	CC6230	270	LDD #WSTAGE4	02B2	33	320	RTS
016A	CF706E	200	LDD #WSCREEN+2	0234	F0D6FA	280	STD WPLAYER-22	02B2	33	320	RTS
0100	F0D6FC	200	STD WPLAYER-6	0237	CC0130	280	LDD #4000	02B2	33	320	RTS
0170	6E3F6FA	210	JMP @PLAYER-22	023A	F0D6FC	280	STD WPLAYER-20	02B2	33	320	RTS
0174	220	WSTAGE4	023D	17006D	280	WSTAGE4	02B2	33	320	RTS	
0174	CC0130	220	LDD #4000	0240	800113	280	LDA 275	02B2	33	320	RTS
0177	F0D6FC	220	STD WPLAYER-20	0243	BB015A	280	ADD A 340	02C2	370FCC	410	LDD WLO
017A	CC0130	220	LDD #WSTAGE1	0246	8430	280	ANDA #01	02C2	370FCC	410	LDD WLO
017D	F0D6FA	220	STD WPLAYER-22	0248	8114	280	CMPA #20	02C2	370FCC	410	LDD WLO
0180	220	WSTAGE1	024C	17037C	280	BHI #U1	02C2	370FCC	410	LDD WLO	
0180	1700FA	220	LBSR @PART1	024F	2015	280	LBSR @PHTHOMR	02C2	370FCC	410	LDD WLO
0180	800113	220	LDA 275	0251	812E	280	BHI #U2	02C2	370FCC	410	LDD WLO
0180	BB015A	220	ANDA 340	0253	2205	280	CMPA #45	02C2	370FCC	410	LDD WLO
0183	841F	220	ANDA #31	0255	1701AD	280	BHI #U2	02C2	370FCC	410	LDD WLO
0188	8105	220	CMPA #5	0258	208C	280	LBSR @HPUT	02C2	370FCC	410	LDD WLO
018D	2205	220	BHI #J	025A	812E	280	BRA #LKT	02C2	370FCC	410	LDD WLO
018F	170273	220	LBSR @HPUT	025A	812E	280	WGI	02C2	370FCC	410	LDD WLO
0192	2087	220	BRA #01	025A	812E	280	CMPA #50	02C2	370FCC	410	LDD WLO
0194	240	WJ	025E	2205	280	BHI #U3	02C2	370FCC	410	LDD WLO	
0194	810A	220	CMPA #10	025E	1702CB	280	LBSR @PDMUP	02C2	370FCC	410	LDD WLO
0196	2203	220	BHI #D1	0261	2083	280	BRA #LKT	02C2	370FCC	410	LDD WLO
0196	170331	230	LBSR @PDMUP	0263	812E	280	WGI	02C2	370FCC	410	LDD WLO
019B	230	WJ1	0263	17023E	280	LBSR @PHTHOMR	02C2	370FCC	410	LDD WLO	
019B	170075	230	LBSR @PART2	0266	17002A	290	WGI	02C2	370FCC	410	LDD WLO
019E	FC0FBC	230	LDD WPLAYER-20	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01A1	93A001	230	SUBD #1	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01A4	F0D6FC	230	STD WPLAYER-20	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01A7	2ED7	230	BOT WSTAGE1	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01A9	CC0130	240	LDD #4000	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01AC	F0D6FC	240	STD WPLAYER-20	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01AF	CC0130	240	LDD #WSTAGE2	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01B2	F0D6FA	240	STD WPLAYER-22	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01B5	240	WSTAGE2	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO	
01B5	1700C5	240	LBSR @PART1	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01B8	800113	240	LDA 275	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01B8	BB015A	240	ANDA 340	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01BC	841F	240	ANDA #31	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01C3	8101	240	CMPA #1	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01C5	2205	240	BHI #0G	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01C7	170373	240	LBSR @PHTHOMR	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01CA	2018	240	BRA #01	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01CC	240	WFO	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO	
01CC	8114	240	CMPA #20	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01CE	2205	240	BHI #0G1	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01D0	170273	240	LBSR @HPUT	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO
01D3	2087	240	BRA #01	0266	17002A	290	LBSR @LKT	02C2	370FCC	410	LDD WLO

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Bill Quentin looks at a package that might ease some of your accounting burdens.

Business Spectrum

There is a sharp distinction between programs written for educational or recreational markets, and programs for use in business. While an error in 'Earnest goes skiing' can cause mild irritation, an error in an accounting package can cause thousands of pounds worth of damage, and even bankruptcy.

Errors occur periodically in all electronic devices, but good circuit design and well composed software minimise both the effect of an error and its frequency.

Errors are normally the result of corrupted data. Data can be corrupted by electrical interference, radiation, tape mechanisms and a wide variety of other phenomena. Errors can also be caused by software bugs or mistakes by the human operator.

When considering how a computer can help your business or private finances you must first decide what errors you're prepared to accept.

Verification should be present on data entry, memory storage, tape storage and tape playback. The program should also allow the cross-checking of results. Even with these precautions it would be sensible to keep a 'skeleton' manual record — just in case.

The Spectrum can play a very valuable role in the administration of your business if it is used conservatively. The computer can be very useful for checking existing records, performing calculations and any area of 'non-vital' data manipulation. It should be used with extreme caution in any task where the results cannot be cross-checked with another system.

the minimum of study. There are several diagrams and tables which help to split up the text. It is written with the small businessman in mind and requires a basic understanding of the Spectrum. However, there is no index and only a brief list of contents. The manual is a little difficult to follow in places.

Colour displays are extensively used by the program. Clever use of the border and ink colours gives an indication of the state of your business, from no profit/bank overdrawn to profit and cash in the bank.

Features

The program complements the main book-keeping requirements of a small

program analyses the figures during data entry and makes the appropriate changes to the Profit and Loss A/c, Balance Sheet, Trading A/c, and the VAT Return, as well as the Nominal Ledger.

This allows the state of the business to be reviewed and provides some of the basic information required for Management Accounting.

The Nominal Ledger has 15 expenditure accounts allowing broad analysis to be performed in the normal divisions of fixtures and fittings, motor vehicles, etc.

The VAT return is an analysis of Sales and Purchases totals for the quarter and year. At the bottom of this screen is the

Manual Accounting Entry:

Cash Book credit — £100.00 — 2/9/83 — John Brown Esq.
credit — £100.00 — 2/9/83 — Andrew Smith Esq.

Purchase Ledger

Willden Accounts Entry:
Cash Book Out — £100.00 — 2/9/83 — j brown
— £100.00 — 2/9/83 — a smith

Alteration to Willden Accounts (saved on tape):

Nominal Ledger — Creditors — £200.00
Bank out — £200.00
Balance Sheet — Creditors — £200.00 Owe Bank — £200.00



The program Small Business Accounts was written for Sinclair and is the only accounting package to be featured in the Spectrum 'Software & Peripherals Catalogue', June 1983.

Sinclair advertises it as having 'high standards of performance, quality and documentation'.

Presentation

The package contains a cassette and instruction manual which runs to 32 pages (A6 size). The manual is well-constructed and allows you to be up and running with

business. Its main use is in the provision of management accounting information, which allows monitoring of a business's performance in order to take appropriate action before trouble arises.

In conventional terms, the books kept by the program are the cash book, petty cash book, and nominal ledger. Specific details of each transaction are not available once the data has been entered into memory. See the example above.

The information saved on tape is the only data available for later analysis. The

total amount outstanding; input tax less output tax.

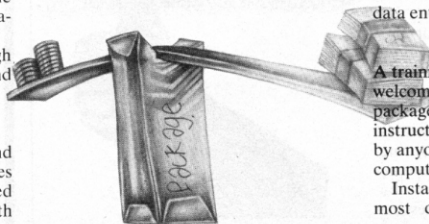
The trading account gives a bottom line gross profit figure which is brought down into the profit and loss A/c. Gross profit is calculated from sales less purchases after adjustment of stock levels. The calculation of gross profit entails the computation of a gross profit level derived from historical data and input into the Spectrum during initialisation.

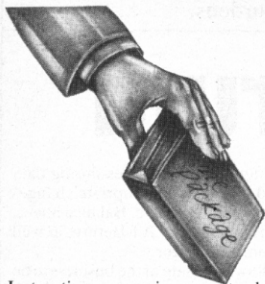
The Profit and Loss Account/Balance Sheet contain information entered during initialisation and data resulting from the data entry parts of the program.

In use

A training program is provided which is a welcome introduction to any program package. The use of menus and 'on-screen' instructions makes the package easy to use by anyone with limited accounting and/or computing knowledge.

Installing the system is probably the most difficult task a user will face.





Instructions are given as to how the program can be adapted to different types of business, from a simple trading operation to a more complex manufacturing company.

The standard 'data entry' methods given in the main menu are very straightforward. The issuing of Credit Notes and Stock Adjustment are equally as easy to perform. Problems arise when dealing with Sale of Assets and general adjustments of data entered during the initialisation stage. These alterations involve changing variables in the program itself. Although full instructions are given, it's likely to be a daunting task, but not impossible, to a non-programmer. The main limitation of the program is its inability to store details on individual transactions. This reduces its potential from a full book-keeping system to a management aid.

The cash-book has no contra facility which necessitates extensive checking of the system with test-data before it can be used for any vital calculation. Gross profit is calculated on a percentage of sales basis.



It would be difficult to allow for sales with numerous profit margins.

The system is designed for a simple trading business with few transactions. The further your business departs from this model, the more problems you will encounter during installation.

Reliability

Loading the program takes about five minutes. Accounting data is stored on a separate cassette which loads in one minute.

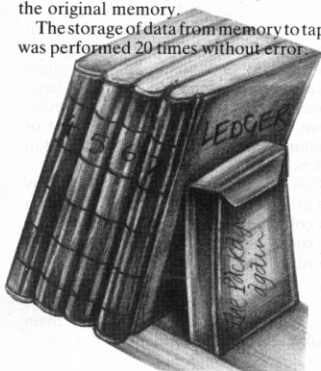
The program is easy to operate during data access, as return to the main menu is executed at any stage by pressing *n*. During data entry it is much easier to become trapped in a routine which can only be exited by entering some figures. Pressing

the wrong keys can result in a crash which necessitates either reloading the program or a BREAK and RUN command.

Great care must be taken at all stages of data entry that the information is being entered into memory correctly. There are no in-built validation routines and the operator is left to test data entry by cross-checking the totals from the manual records with the totals accumulated in the Ledger.

Validation is performed on both loading and saving from tape. The validation procedure involves a *save* and *load* procedure. The data from memory is first saved on the tape. Then the tape is rewound and the data from the tape is loaded back into memory to be compared, bit by bit, with the original memory.

The storage of data from memory to tape was performed 20 times without error.



Verdict

The program is a worthwhile training aid, and as such it may be attractive to many people. A business user considering the purchase of a large business computer and the student wanting to learn basic accounting procedure, will both benefit.

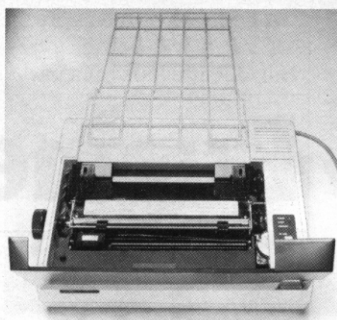
The program is well written and the manual is informative, if a little vague in parts. A little knowledge of both the Spectrum and accounting techniques will greatly help your understanding. Willden has managed to put quite a lot into a very small package.

RATING

- Features
- Documentation
- Performance
- Usability
- Reliability
- Overall Value



Name Small business accounts System Spectrum
Price £12.95 Format Cassette Publisher Willden
Services, 0892-852539 Distributor Sinclair.



Specifications of the new Walters WM80

Printing method: Impact dot matrix.

Printing format: Alpha-numeric: 7 x 8 in 8 x 9 dot matrix field. Semi-graphic (character graphic): 7 x 8 dot matrix. Bit image graphic: Vertical 8 dots parallel, horizontal 640 dots/serial/line.

Character size: 2.1mm w x 2.4mm h / 7 x 8 dot matrix.

Character set: 228 ASCII characters. Normal and italic alpha-numeric fonts, symbols and semi-graphics.

Printing speed: 80 CPS, 640 dots/line per second.

Printing direction: Normal: Bidirectional, logic seeking. Superscript and bit image graphics: Unidirectional, left to right.

Dot graphics density: Normal: 640 dots/190.5mm line horizontal. Compressed characters: 1,280 dots/190mm line horizontal.

Line spacing: Normal: 4.23mm. Programmable in increments of 0.35mm and 0.118mm.

Columns/line: Normal size: 80 columns

Double width: 40 columns

Compressed print: 142 columns

Compressed/double width: 71 columns

The above can be mixed in a line.

Paper feed: Adjustable sprocket feed and friction feed.

Paper type: Fanfold. Single sheet thickness: 0.05mm to 0.25mm.

Paper width: 101.6mm to 254mm.

Number of copies: Original plus 3 copies by normal thickness paper. (Max 0.25mm.

Total thickness of 4 ply).

MTEB: 5 million lines (excluding print head life).

Dimensions: 377mm w x 295mm d x 125mm h, incl. sprocket cover.

Weight: 5.3Kg approx.

Power requirement: 240 v ac.

Data transfer rate: 4,000 CPS max.

Synchronization: By external supplied STROBE pulses.

Handshaking: By ACKNLG or BUSY signals.

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Impressive performance

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Programmable functions

The standard interface is Centronics parallel, RS-232C (SERIAL) is available as an optional extra. Programmable functions include variable margins and line spacing, horizontal and vertical tabulation, and 7 international language character sets. In total, it offers a 228 ASCII character set and has self-test facilities.

Major control codes include NUL, buzzer, backspace, line feed, horizontal and vertical tabulation, paper advance, carriage return, shift in, shift out.

Paper transport is by adjustable sprocket feed or friction. It uses fanfold paper, from 4" to 10" wide, printing up to three clear copies from an easily changed cartridge ribbon. Life expectancy of the print head is approximately 30 million characters.

Ordering your WM80

The WM80 can be ordered by phone on 0494-32751; or by sending this coupon to: Walters Microsystems International, 'Matrix House', Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks HP12 3RD.

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WALTERS MICROSYSTEMS INTERNATIONAL

Simon Williams finds an adaptable program for smaller databases — Masterfile for the BBC B.

One of the main uses for a home computer, is the storage of data. To handle this data effectively, some kind of filing system is required which will allow the user not only to add, amend and delete files, but also to search through them for specific items and to sort them into various categories. Masterfile is available on cassette or disk and PCN tested both.

Features

Masterfile offers the facilities of setting up a file of individual records, each containing a number of fields. These records may be amended, deleted, searched, sorted or printed out in a variety of formats. The same program may be used to handle many different sets of data, so the user could set up a record index, club membership file or list of customers and handle them all at different times under Masterfile.

Documentation

Both cassette and disk versions of the program come with a slim manual which explains the various functions of the program. The disk manual is smaller in format but better presented. It is also longer, because it covers the extra facilities offered. Both manuals describe the program well, although the cassette manual would benefit from the use of larger headings. Since it also has no index (unlike the disk version), it is difficult to use it for reference.

In use

The fundamental difference between cassettes and disks is that with the latter, use can be made of a random access file. This means that any record held on the disk may be read off in a couple of seconds. With cassettes, either a data cassette must be reloaded and read for each data item, which is not really practical, or all the data must be loaded at once and held in the computer's memory along with the program.

This, of course, puts a practical limit on the number of records that may be handled at any one time.

The limit on the cassette version is 550 data items, which means, for example, 55 records with 10 fields in each or 275 records with only 2. This does, in fact, prove quite a limitation to the program's use. Within this limit, however, the program works very well in most respects. The main menu, which is presented on start up; lists 11 options:

- A Set up file name
- B Enter file description
- C Look at, or alter a record
- D Printer line length
- E Load data file
- F Save data file
- G Enter search date
- H Print (and/or search) file
- I Sort
- J Start again completely
- K Stop the program



Master your file

The file is named using Option A and the fields associated with each record are set up with Option B. Each field must be titled, given a set length and be defined as containing string, integer or numeric information. Option C is the main part of the system and is used to view and update any record on the file. Records may be selected at random by calling their record number, or cycled through sequentially.

On the cassette version there are separate options to load and save data files and these options are adapted on the disk version to open and clear a disk file.

A sort may be carried out on the records in a Masterfile file using any field or combination of fields as key/s. For a disk file of only 50 records, however, a simple alphabetical sort on one field will take in excess of 7 minutes. This can't be described as fast.

The cassette system is quicker, since all its files are held in memory, but even so can take a good while.

Searches can be carried out using a variety of 'matching' criteria so, for example, the user could extract all male members of a club who joined in a given year and lived in a particular town. Unfortunately there is a bug in this part of the cassette program and certain types of match are not recognised by the search routines unless also selected for printout.

The output from searches may be directed to the VDU, printer paper or address labels. The screen layout on this particular option is very untidy, with instructions or requests appearing all over the display and overwriting each other.

Extra facilities available on the disk version of the program include the transfer of files from tape to disk and vice versa, the

ability to append one disk file to another and the option of performing global calculations on numeric fields in a similar way to a spreadsheet program. This last ability is very powerful, as virtually any mathematical function available on the BBC micro may be used.

Verdict

Apart from the bug mentioned, Masterfile works well and offers an efficient program for small-scale databases. It could be much improved with a faster sort algorithm, possibly in machine code, and Beebug intend to include this in a future version. Unlike many software houses, Beebug has not protected this program and positively encourages the purchaser to dive in and adapt it to their own requirements.

The disk program, by virtue of its use of random access files, is a very different animal from the cassette, and anyone considering the latter should bear in mind the maximum size of file that the program will handle.

RATING	disk	cassette
Features	↑↑↑↑	↓↓↓
Presentation	↑↑↑	↓↓
Performance	↑↑↑	↓↓↓
Usability	↑↑	↓↓
Reliability	↑↑↑	↓↓
Overall value	↑↑↑	↓↓↓

Name Masterfile System BBC B Price £10.00/
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Street, High Wycombe, Bucks HP11 2TD
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WIN A SPECTRUM!

It's here. This page was expected to be published in last week's issue but is making a sadly overdue appearance so you can complete your entry for the Micropaedia competition. Many apologies for the production problems that caused its vanishing act and we extend the deadline for competition entries to December 15.

After eight long weeks here at last is your chance to win one of the ten Sinclair Spectrums we have up for grabs.

Having collected the coupons from the last eight issues you are now at the last hurdle - a simple test of how closely you've been following the programming Micropaedia. Just answer the eight questions below, each one relating to a part of Micropaedia, and send it to us before the closing date on December 15.

The first ten correct solutions opened after December 15 will win the Spectrums.

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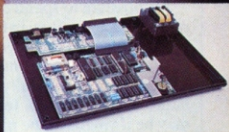
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Need a monitor for your micro to maintain familial bliss? Bill Davies presents a run-down.

Talking of tubes



Sony's Trinitron: not the cheapest domestic TV on the market but its high definition makes it a popular choice for television watching computer enthusiasts.

The Zenith green screen monitor provides a steady high resolution picture for a resolutely low price.

Many people have spent the last few months annoying the rest of the family by monopolising the television set with the computer. We've taken a look at the alternatives on offer at the lower end of the price bracket.

It's possible to spend many hundreds of pounds on a monitor; in fact, the sort used by the professional TV companies at the BBC and ITV sometimes cost well into four figures. It's not really necessary for the home computer user, tempting though it may be if you have the money.

What you use your computer for will influence your choice of visual display unit and in most cases you are restricted about the methods of feeding a signal from the computer itself.

Micropaedia in this issue goes into more detail of the various types of monitor and what they mean.

You usually have three options — composite video, RGB and RF modulated as on a normal TV set. Some computers have all three outputs, some two, but all have RF. We put a number of different types of visual display units to the test using a BBC model B computer. All the sets we chose for review are equipped to the PAL television standard and would be compatible with any home computer on the British market which has the relevant video output connections.

The BBC machine has facilities to hook up all three types of output, but the composite video is only in monochrome. If you use the computer for word processing or business and accounts work you will probably find that a monochrome display will be perfectly adequate. This can consist

of a black and white television set or a dedicated green or amber screen monitor. Either of these options provides the cheapest way of obtaining a display.

Green/Amber screen monitor Zenith Data Systems make both green and amber screens. Amber are generally £15 to £20 more expensive than the more common green screen.

I usually use a Zenith green screen monitor for my word processing work, but for this test I also looked at the newer amber screen. The main advantage of having a dedicated monitor comes home to you whenever you find yourself sitting in front of a television screen for hours on end.

The screen display is flicker-free and the letters are clear and precise. When used in Mode 7 (Teletext mode) there is little to choose, but if you switch to 80 column (mode O) the monochrome monitor really pays off.

Whether the extra cost of the amber screen is worth it or not is very much a personal decision.

The Zenith monitors come with a minimum of controls, brightness and contrast being the most used. On the new models all the controls for adjusting vertical/horizontal hold, brightness, contrast and vertical screen size are positioned on the front. Zenith have also added an LED by the on/off switch to indicate if the set is powered or not.

Dedicated Colour Monitor I tested a new all British made Cabel colour monitor. Cabel Electronics has been making monitors for the home computer market since early this year and pricing them at about £230

including VAT which means they are very competitively priced at the moment.

The Cabel monitor is RGB fed, although the company says they are planning to bring out another model in the New Year which will be capable of taking either RGB or composite video.

At that price you inevitably get a very basic monitor. The screen display is sharp and flicker-free, but the definition is not really good enough to use with Mode O on the BBC machine with 80 column display.

I found the colours generally good and reasonably true and working at about three feet away from the screen wasn't too much of a strain.

The monitor comes with six feet of cable and an RGB lead compatible with the BBC Micro. If you wish to use it with any other make finding a compatible lead shouldn't be too much of a problem.

The monitor is in an attractive white plastic case with the screen sloping back slightly so if it's placed just behind the micro it is easy to see and read. It does, however, weigh about 16 kilos.

On the front is an LED to indicate power on/off, a brightness and contrast control and the on/off push button switch. All the other controls are underneath the set and require tuning wands, thereby keeping out prying fingers.

Fidelity has recently announced a monitor priced at £199 including VAT which will accept both RGB and composite video, but unfortunately at the time of writing this review the set wasn't available. This monitor could be handy for someone who might have more than one computer, which have different video outputs.

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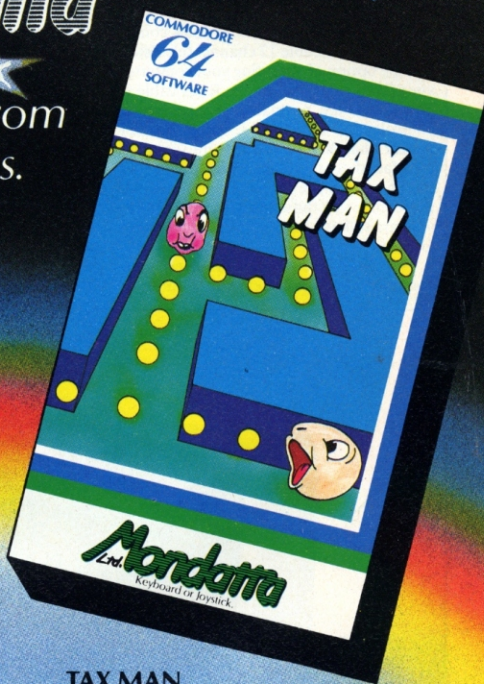
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Television/Monitors A recent trend on the market has been the introduction of the domestic television set that is also a monitor. There are a number around, but we took a look at the cheapest one from Normende.

The screen size is 14in and it is small enough to be used comfortably just behind the computer.

Priced at £250 the model 1534 comes with a fully tuneable 12 channel television and the option of operating your computer via a 7 pin cable. When the RGB cable is plugged in the normal television tuning controls are disengaged, so it doesn't matter what channel you have the set tuned to; a fact that might take a little time to get the hang of, since the instruction manual that comes with the set, made in Singapore, appears to have been translated from the German into Chinese and back again.

You have the option of using your computer through either the RF tuner or

through the monitor direct. Using it through the tuner you tune the set to channel 36 and use the channel 12 button, so with this particular set it was possible to make a true comparison between RF and monitor. The signal through the RF modulator was appreciably worse than direct through the monitor.

The big advantage of this set is that for a little more than the price of a regular television portable you can have a set which can be used well through the computer for playing games and using 40 column text; and of course if it is a second set you have a spare if the main one breaks down — or someone wants to watch a TV programme.

It has to be said that the monitor picture quality, though good, is not as clear as the one I looked at on the Cabel dedicated colour monitor, and although I don't recommend using the colour monitor for 80 column work, I found that on the

Normende, 80 column was virtually unreadable even in monitor mode.

The review set was only capable of accepting an RGB input, but with a slight modification the set may possibly be made capable of accepting composite video — ie for the Dragon.

A further advantage of buying a television/monitor is that because there's sound with it you can use it with computers which feed sound through the TV set, or with a video recorder using the video/sound output.

Sony Trinitron The Sony is not the cheapest domestic portable colour TV on the market, but because it has exceptionally good, clear definition, it has become very much the 'industry standard'.

The picture is fed from the RF socket at the back of the computer and it will work with any home computer. Tuning the set to around channel 36 should give you a picture from the computer.

The secret of the Sony is that the Trinitron tube, unlike those of rival manufacturers, has only one 'gun' at the back. This means that there is little or no chance of convergence problems. For normal domestic TV viewing this doesn't cause too much of a problem, but when you are using a computer often, working closer to the screen than normal, and with a lot of text to read, it gives a brighter, sharper picture. Perhaps Sony will introduce a cheaper monitor using the Trinitron tube and aiming at the home computer market.

Verdict

What you finish up buying is very much up to you. If you want a monitor purely for business use, such as word processing or accounts work then an inexpensive green or amber screen monitor will probably suffice.

If you are sufficiently dedicated and use the machine a lot for games playing, and can afford to have a television set which is used for that and nothing else then a dedicated colour monitor will be for you. If your family is looking for a second television set, either as a spare if the main set breaks down or so that the rest of the family can go off and watch Crossroads while you improve your mind with Sale of the Century with a better than average display on the computer, then the television/monitor is your best bet.

Finally, if you want a better than average television which also gives you an adequate computer output then you should consider the Sony. At the end of the day the decision lies between you and your bank balance.

Zenith Monitors Zenith Data Systems, 0452 29451 **Price** £109 (Green screen) £115 (Amber screen) **Outlets** retail.

Cabel Colour Monitor Model CE370A **Price** £199.50 + VAT **Outlets** Cabel Electronics, 0684 298840, Mail Order, some retail.

Normende TV/Monitor Model 1534 **Price** £259 inc VAT **Outlets** Microstyle 0635 42570

Sony Sony UK Ltd. 01-941 5717 **Price** £250 approx **Outlets** Retail.



Text handling benefits from the stability of a monitor but even small television screens are capable of displaying information and graphics with acceptable resolution like the 9 inch Panasonic below.



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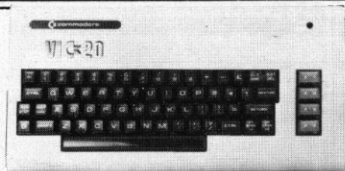
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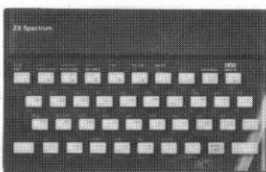
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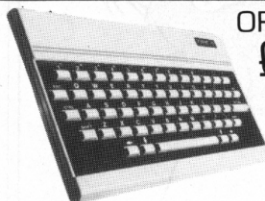
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GOLF

Being a fan of Microdeal software since *The King*, I was very disappointed with the graphics offered by *Golf*. Perhaps I've been spoiled or was expecting too much.



You play a round of up to eight holes with a maximum of four players. The player who finishes with the least number of strokes is the winner. You define the course beforehand as either easy, tough or unbelievably difficult.

At first the selection of clubs available for each stroke was bewildering. Being a novice, I was lost by the choices of four woods, eight irons and a chipper.

Mis-hits occur during play and you can end up in the rough, the water or a sandpit (that's a bunker). The display is limited to a bird's eye view of each hole, with the number, par, distance and player details on screen. Once the club type and number have been selected, direction is chosen using a clockface, you hit the spacebar and the ball takes off.

Dither over a shot too long and the machine prompts you with terse messages. When you finally make the green, the display changes to a circular green and all you need to specify is the distance you want the ball to travel and in which direction.

Fun for a group of would-be golfers on a wet Sunday afternoon, but there's nothing more frustrating than seeing your ball sail straight over the hole, or perch on the edge, or land again in the rough.

Needless to say I didn't manage a hole-in-one, but on one or two holes (on the hardest setting) I did get a respectable one over par.

UXB

You are presented with a monster bomb and told to defuse it. While this game won't give you the sweaty palms of the real thing, it was exciting to play



You have to select six tools

from a list of 12 for your task and with the exception of one, these must be taken as you need them. A wrong decision at any time results in the bomb exploding, taking you with it.

An attractive use of graphics and text throughout. Once you've been blown up you can return to the start or go back to the last stage. Unfortunately, if you pick up the wrong tool there's no apparent way of dumping it, and carrying more than six will result in your early demise.

Help is occasionally offered — when asked — and a menu is instantly available, as is a look inside the bomb.

Having played the game through to the end and defused the bomb there's yet another obstacle to overcome, which I'll leave you to find out.

You're offered the chance of another go at the very end, but as the combinations and the scoring seem to remain the same I didn't see much point in replaying it.

INTERGALACTIC FORCE

Microdeal hasn't overlooked the homicidal maniacs among their customers, and for those whose greatest delight is seeing how many millions of aliens they can zap at a sitting comes *Intergalactic Force*. Here you are in command of a spaceship flying along a three-dimensional corridor that comes out of the screen towards you. Above you is a fighter ship firing lasers down on you, while beneath you from time to time will pass an air-shaft down which you must drop a bomb to destroy the alien invaders in their spaceships below.



With three skill levels and a choice of fast or slow speeds, this is the type of game to present a challenge to most people, the kind which is reasonably easy to master but then grips you as you play and play and know that one mistake could be fatal.

You begin with five ships and receive a bonus one for each, 1000 points, the scoring being

ten points for a fighter above you and 200 for a bomb down a shaft. You only have a limited number of bombs, and when these have run out you replenish your supply by moving your ship up off the top of the screen and back down again past the fighter.

A joystick is vital for this one, which has the requisite zap-blast sound effects with the TV on at full volume, and the machine code action ensures a smooth and fast game.

Not a game for everyone, but a good version of its kind.

KEYS OF THE WIZARD

The same might be said of *Keys of the Wizard*, the first adventure game that Microdeal have released for a while. This one originating with Spectral Associates.

To really succeed you need to find all 32 treasures and take them to a place called the Sanctuary, if you can manage to find that. For all this you will be rewarded with 662 points, music, a special winning message, and, for all I know, a line of dancing chorus girls and a 21-gun salute.

There are three skill levels, the easiest being for novices and only revealing part of the game. This level is recommended so that you can get used to the various commands and the general make-up of the game, and should be completable in less than six hours.

Level two is a little more complicated, as the creatures who are out to get you are of a nastier frame of mind, and this should keep you occupied for up to ten hours. On level three you get the works.

The commands are mostly entered in the usual verb-noun fashion.

There is nothing particularly unusual or different about *Keys of the Wizard*. The seasoned adventurer might prefer to look elsewhere, but for the rest of us it's a program that should provide value for money and accompany many a late-night drinking session . . . sorry, thinking session.

LANDER

Not another Lunar Lander. I thought at first, but this version from Software Scene is a cut above some I have seen. The object is, of course, to land your lunar module as gently as possible. Landing too fast, either vertically or horizontally, too far from base, without your landing gear down or running out of fuel results in your demise. This is marked by a rather dull screen display in block graphics (and a welcome to the celestial choir).



You start by choosing your rank, between marshal and cadet, though the only difference this seemed to make was to vary your initial fuel quantity. The module's instrument console is well designed and shows you all the relevant detail — vertical and lateral speeds, altitude, distance from base, fuel, landing gear down, main or secondary engines and so on (the secondary engines have to be brought into play to negotiate the final landing phase). A neat touch is a warning panel through which various messages scroll.

If you're struck by a meteor you should end your space suit. Once landed, or if you decide to abort a bad attempt to land, you reach the second phase — which seems to have been tacked on as an afterthought. Here you have to take off, then dock with the mother ship in orbit by matching altitude and velocities.

This is an unexciting affair, though just as hard as a good landing. Apart from being told that I was leaving orbit when I should have been told that I was reaching escape velocity, this fairly simple game is effective and encourages you to have just one more go to get right, but I doubt that it would have much long-term appeal.

Golf, *Intergalactic Force*, *Keys of the Wizard* (£8 each), Microdeal, 41 Truro Road, St Austell, Cornwall.

UXB (£6.95), Virgins Games Ltd, 61/63 Portobello Road, London W11.
Lander (£5.95), Brooklands Computer Graphics, 13 Castle Street, Dover, Kent

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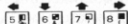
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Name Zeppelin System Atari 400/800/XL series **Price** £24.95
Publisher Synapse, USA **Format** Disk, cassette & cartridge
Language Machine code **Other versions** none **Outlet** Norwich Camera Centre, 20 White Lion Street, Norwich NR2 1QB, 0603 612537

Forget all about your hyper-space-jumping, multi-rocketed, laser-lancing planetary cruiser — that's so much old fashioned scrap metal. To be really up to date these days, you've got to go back in time to the days of barrage balloons. You need a Zeppelin.

Objectives

The gaseous atmosphere of the cave world of Zarkafir has led to the development of hot air technology. Into this world in a superzeppelin you come, bent on destroying the evil Time-lords whose base this is.

In play

The tape takes a fair time to load but don't turn the sound of your TV down or you'll miss two pieces of classical music.

The action starts with your large white zeppelin gently powering through the seventh level of the cave system. Joystick movement controls your direction, although you are always moving forwards through the cave system.

Your zeppelin can fire in two directions at once, and you certainly need that firepower. The caves seem alive with small

hot air balloons and zeppelins which you must avoid or destroy.

Rocks and earthquake debris cascade upon your frail craft and when an earthquake occurs, the whole screen shakes, making your passage a nightmare.

Barriers and laser gates must be blasted through if you are to explore all of the 250 rooms of the caverns. The screen scrolls gently in the direction you are heading, and forks to other caverns seem to appear from any compass point. Shooting the various switches turns some enemy defences on or off. Although each switch has only one function that never varies, it's up to you to discover which that function is.



Other problems include picking up keys for dropping into keyholes, gathering hamburgers (for feeding to the hamburger creatures, of course) life markers for rejuvenation, TNT and plungers. These are tricky; you must shoot the plunger to bring it into the up position, deposit the TNT and then shoot the plunger again — your reward for this feat is entry to the next level.

Verdict

As usual with Synapse games, this has stunning graphics, colour and sound. Another winner — and that's not just hot air!

Bob Chappell

RATING

Lasting appeal 
Playability 
Use of machine 
Overall value 



Snoopy's day-dream

Name Blue Max System Atari 400/800 **Price** £24.95 **Publisher** Synapse, USA **Format** Disk & Cassette **Language** Machine code **Other versions** Commodore 64 (soon) **Outlet** Home Computers, 234 Church St, Blackpool FY1 3PX Tel. (0253) 22340

Bored with firing at foreign beings from outer space? Fed up to the teeth with bashing bugs and beetles? Weary of wading into wizards and warlocks? Blue Max will change all that. This is a game with its feet planted firmly in history and its head, literally, in the clouds.

Objectives

In 1915, Max Chatsworth's entire squadron was cut to ribbons by enemy planes. The RAF pilot vowed revenge and the following month shot down 13 enemy planes. The Axis offered the most prized medal — the Blue Max — for his defeat. From then on, he was nicknamed 'the Blue Max'.

You are Blue Max of the RAF, in charge of a fighter bi-plane. Your mission is to pulverise the enemy by bombing and strafing their airfields, bridges, ships, buildings, anti-aircraft batteries, vehicles, tanks and fighter planes.

In play

With this theme, what else could start the game but a rendition of 'Rule Britannia'? The screen provides an aerial view of the scene below with information such as speed, altitude, score, remaining fuel and bombs being displayed at the bottom of the screen.

Your bi-plane is revving up on an airstrip and soon starts to taxi down the runway. When its speed reaches about 100mph, pulling the joystick has it lifting off smoothly into the air, its shadow helping you to gauge its height. Below is a smoothly scrolling and fine-detailed landscape of fields, rivers and bridges. Ships moored or steaming up river let rip with anti-aircraft fire as do a host of gun emplacements. Enemy planes come at you from below and above, behind and in front, but only one at a time.

Diving slightly and firing releases one of your bombs. The sound effects and graphics are superb; if a bomb lands harmlessly in the river, there is a loud splash and it disappears beneath the water. If it hits the ground, there is an impressive explosion and a crater opens up. A direct hit on a bridge leaves a gaping hole through which you can see the river.

Strafing is most effective when flying at around 25 feet and holding the fire button down releases a barrage of white tracer bullets with tremendous explosions on striking enemy tanks. When the action is fierce, it is easy to be dazzled by the amount of on-screen movement.

Verdict

One of those programs to make you 'Ooo!' and 'Ahh!' with delight at the brilliantly detailed graphics and action. The sound effects are spot on, too. Deserves a medal of its own.

Bob Chappell

RATING

Lasting appeal 
Playability 
Use of machine 
Overall value 



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COMMODORE

Scramble angle

Name Scramble System
Commodore 64 Price £7.95
Publisher Anirog Software, 8 High Street, Horley, Surrey
Format Cassette
Language Machine Code
Other Versions None
Outlet Retailers/Mail Order.

It was always on the cards that a version of the arcade Scramble would soon appear on the 64, and here it is.

It's one of the easiest I've played, but that said, I still can't get beyond the fifth section (out of six).

Objectives

The aim is to get through all six of the levels right up to the Cobron base. On the way, life is made pretty unpleasant for you by a whole range of different methods.

In play

Another joystick-only game from Anirog, but even if you vastly prefer keyboards, you'll still find Scramble is fun. Your interest is maintained by wide variety and the game is fast and packed with action.

The delay between games, however, is very tedious, and looks like it's just a way of proving that Anirog have the technical ability to move their company logo around the screen. It's interesting to see once, but once only.

You control a small fighter/spacecraft and fly it from left to right. You can move up and

down, going forward speeds you up, backwards slows you down.

The fire button gives you bombs and bullets at the same time, and it's almost essential to keep firing. If you don't, you're liable to miss out on the ammo dumps and fuel supplies, without which you die, or get killed which spreads your wreckage across the screen.

First you cross mountains, and rockets launch up towards you. If you negotiate this section you then find a series of up and down UFOs waiting for you. They tend not to wait around, so you must shoot them down quickly. If you can.

Section 3 has fireballs coming at you. And you can't shoot them down either, so it's worth dodging them. If you can. Section 4 boasts a city with very tall tower blocks, which means staying at the top, and, if you get through this, you run into the maze. This is the bit I haven't yet mastered. The ups and downs of the maze are pretty tricky, and at this stage you need four-way controlling on the joystick.

I have yet to get on to section 6.

Verdict

I enjoyed this game a great deal, and can thoroughly recommend it. Quite fast, not too hard, but not too easy either, and fun to come back to.

Piers Letcher

RATING

Lasting appeal



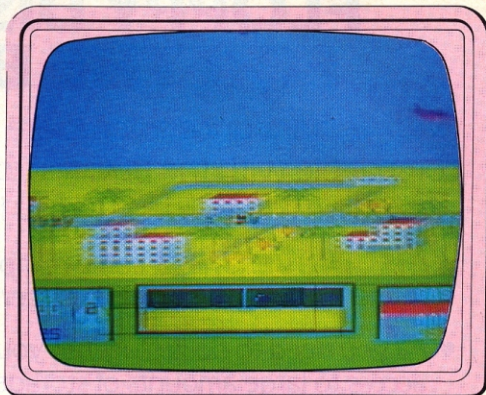
Playability



Use of machine



Overall value



Shoot 'em up

Name Falcon Patrol System
Commodore 64 Price £6.95
Publisher Virgin games, 61/63 Portobello Road, London W11 3DD
Format Cassette
Language Machine code
Other versions None
Outlets Mail Order and retailers.

Some Virgin Games products have had exciting publicity and then not really lived up to their promise. However, one of their latest offerings, Falcon Patrol, is a first rate game and Virgin looks set to hit the jackpot with it.

Objectives

Flying a VTOL (vertical take off and landing) jet fighter armed with 100 anti-aircraft missiles, your job is to defend fuel and armament installations against enemy aircraft. The enemy come barrelling in with their bombs and must be shot down. The more enemy planes you destroy, the greater the subsequent reinforcements.

In play

The game begins with some stirring chords to put you in the mood for the drama to come. Most of the screen is taken up with an impressively detailed landscape, showing buildings, roads, palm trees, transport and fuel depots. At the bottom left of the screen is the score board, giving current score, highest score and lives remaining. Bottom centre is the radar window showing your current position as a vertical band with moving white dots indicating the whereabouts of enemy aircraft. Fuel and missile informa-

tion is clearly provided at bottom right.

Your jet gently lands on a fuel base to take on initial supplies. Movement of the joystick has the jet turning and flying in the appropriate direction.

The graphical depiction of the jet is excellent. Flying up or down has the angle of the plane turning in the relevant direction. Executing a sudden U-turn doesn't result in the usual abrupt about-face; instead, the plane slows and turns to the front before moving off in the chosen direction. Altogether, there are seven different views of the plane in flight.

As you fly, a generous landscape scrolls evenly below you and the red enemy fighters swoop across the sky. Bombs hitting buildings or the ground cause fires which go out if you leave the scene for a while. If you touch an enemy plane, your jet catches fire and ploughs into the earth. Pressing your fire button releases a missile which blows the enemy plane to bits.

You need to keep your wits about you.

You also need to keep a watch on your remaining fuel and missiles — further supplies are obtained by landing carefully on an appropriate base. The enemy have no scruples about bombing you while you sit serenely on a refuelling base.

Verdict

A fast-action and compelling game which I highly recommend.

Bob Chappell

RATING

Lasting Appeal



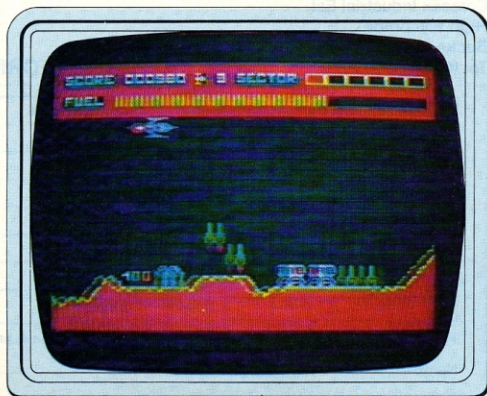
Playability



Use of Machine



Overall Value



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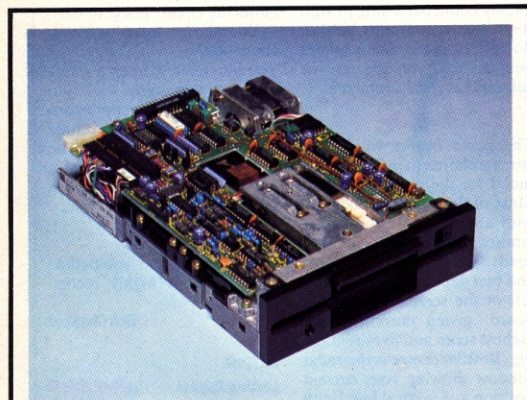
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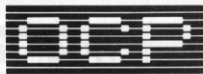
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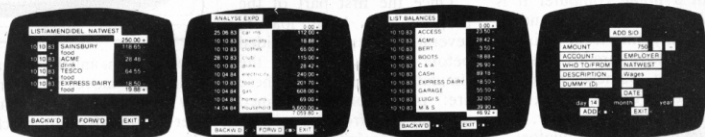
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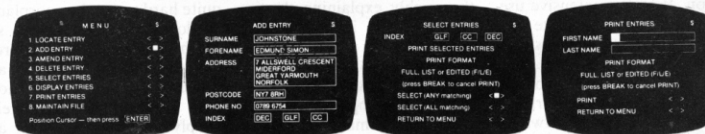


Accounts can be **MERGED**, **DELETED**, **ANALYSED**, **MARKED** as priority, **RENAMED**, **EDITED** and **SCROLLED**. Transactions can be **RECONCILED**, **AMENDED**, **DELETED**, **DESCRIBED** for analysis and **RENAMED**. Standing orders can be **APPLIED**, **REMOVED**, **DESCRIBED**, **AMENDED**, **DELETED** and even **DUMMIED** for planning purposes. Other features include **DATE CHANGE**, **RUNNING TOTALS**, **2 KEYBOARD MODES**, **PRINT PAGE/LINE/BLOCK/FROM END/FROM START/FROM DATE** etc., **LIST BALANCES**, **FIELD ERASE/INSERT/DELETE**, **EXIT TO BASIC**. You may not want all these features but they are there just in case.

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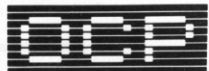
USES include storing and updating names, addresses and phone numbers, printing out Xmas card lists, etc, mail order work, customer classification by type size (doctors have used this program to catalogue patients by treatment).

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BBC MODEL B

Flight of fancy

Name 737 Flight Simulator **System** BBC micro **B Price** £9.95 **Publisher** Salamander Software, 17 Norfolk Road, Brighton, Sussex BN1 3AA
Format Cassette **Language** Machine code **Outlets** Mail order and dealers

With a home computer it is possible to try your hand at flying anything from a single-engined light aircraft to a 747 jumbo jet. Somewhere in between these two extremes, both in size and complexity, fits Salamander's 737 simulator.

First impressions

Packed very smartly in the kind of plastic package normally reserved for videocassettes, the simulator consists of a single cassette and a 28 page, neatly-printed flight manual. This manual covers the practicalities of loading the two-part program, details all the simulator instruments and controls, offers some flight theory, and even provides a basic flying lesson. It makes extensive use of diagrams to illustrate the instrumentation of the simulator.

Airfield charts of Edinburgh airport are enclosed (courtesy, apparently, of British Airways) as this is the preset airfield used in the program. The documentation is very comprehensive for a program of this type.

In use

Unfortunately, the first copy of

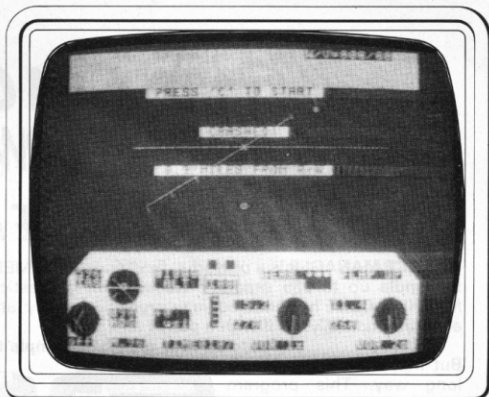
737 simulator had to be returned to Salamander as it was unloadable. A second copy proved to have the same fault, but a third gave no problems at all. Although Salamander were quick and efficient at providing replacements, the problem might have been avoided if they had followed the practice of some other software houses in providing a second copy of the program on the same tape.

Once the first part of the program has been loaded, several options are provided before the main part of the simulator is Chained in. These are: preset or user-defined airfield; start from take-off or mid-flight; engine noise volume (0-5); aircraft stall speed.

The last of these options is useful for the novice user, as it allows the plane to fly more slowly than in real life without falling out of the sky.

The first use of any flight simulator is a daunting experience. There are so many different instruments and controls that it seems impossible to work out what to do with them. The Salamander simulator does its best to ease this problem by thoroughly explaining the instrumentation in the manual and by choosing mnemonic keys for the major controls.

The screen shows the flight deck of the aeroplane, although no attempt is made at a model on original. Through the cockpit window the view is either of the runway and horizon (on take off and landing) or 'radar' map of the area immediately surrounding the airport. Both views are simple, diagrammatic



representations and the runway in particular moves in a fairly jerky fashion as it travels up under the aircraft on approach.

There is a certain amount of flicker in the display as it is updated fairly slowly and the keyboard is scanned about every half second, so the command keys must be held down at least this long. All commands are acknowledged with a beep but it is easy, in moments of panic, to forget to wait for this confirmation, with unfortunate results for the crew and passengers!

The 737 simulator is a very lenient program and it really is quite hard to get the aeroplane to do anything untoward, so much so that Salamander provide a special function to cut all engines. Even this situation may be dealt with relatively simply however, and after an afternoon's preliminaries, trying out the various controls, it should be possible to take off, fly around a bit and make an attempt at a decent landing.

All the same, if you step too far out of line with a near-perfect flight path, you get flashing warnings and annoying noises. Should you go so far as to get into a really hairy situation, the screen judders so much that it's almost impossible to read the dials. This is, I suppose, acceptable, since by then you're irrevocably on a collision path for the hard, hard ground.

One drawback to the program is that you only get enough fuel for about 25 minutes flying time. This means that if you foul-up a landing close to this limit, there's little chance of circling around and coming back for a second attempt.

At any time during a run of the program, a depression of

the 'O' key will bring up a selection menu, allowing the plane to be repositioned at various points on and around the runway. The 'feel' of the simulator is good, supported well by as realistic a jet engine sound as you are likely to hear from a BBC micro.

It is possible to define an airstrip and to adjust windspeed and the position of navigation beacons to tailor the simulator to your specific requirements. Apart from this, however, there are not a lot of different things that can be done with the program. It would be interesting to be able to strike out across country heading for Heathrow or Bristol, or at least to be able to practise descents at other airports. The manual claims that the program fills just about all the available space not taken by the Mode 1 screen. Even so, to be truly competitive with other simulators now coming onto the market, this kind of facility ought to be seriously considered.

Verdict

As an aviator who tends towards the Buster Keaton school of flying rather than the Brian Trubshaw, the tolerance to error of the 737 simulator was very welcome. If only the program incorporated several airfields to practice on. As it is, the program is fine for 'circuits and bumps' but may, perhaps, pall once the pilot has mastered the controls.

Simon Williams

RATING

Lasting appeal



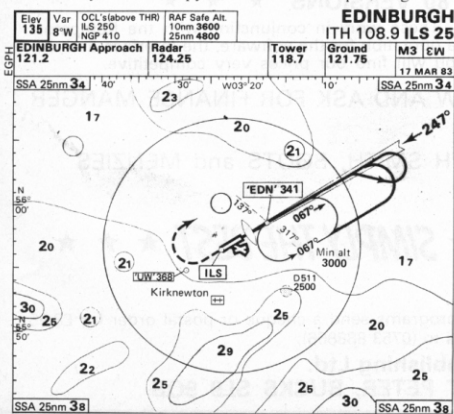
Playability



Use of machine



Overall value



CHOOSING A HOME MICRO

WARNING

Choosing a home micro can be a daunting task to the newcomer, and with an ever increasing number of micros emerging on the market, even up-grading, say, from a ZX81 can be a risky and expensive exercise if the wrong decision is made. It is important to look at the real facts and specifications, and check exactly what you get for your money before choosing your micro-computer system.

THE PITFALLS

"DON'T LET THE ADD ONS ADD UP"

A number of large companies are offering packages that seem to be good value and low cost. These offers usually have a hidden sting inasmuch as the essential accessories such as connection leads, peripherals and software often carry very high cost premiums, e.g. software for low cost hardware usually costs between £29 and £49 for a ROM cartridge!!

CHECK THE QUALITY OF THE PRODUCT.

Raw materials are now an area where corners can be cut, and shoddy workmanship during 'building' can effect the 'up-time' of your unit. Areas to watch out for are unreliable edge connectors, corrosion and poor quality P.C.B.s. Low quality components and bad design will seriously effect the reliability of the end product, and can lead to false economy.

DON'T BUY A GAMES MACHINE

Unless you want just games and nothing else! With a games computer you are limited. Some computers, however, have the advantage of both games facility plus the whole world of computing to explore, as your interest and skills develop. A real computer system will allow you to expand your knowledge of the Hi-Technology world, and help earn its keep with its added uses in the field of education, communication and home business use.

SOFTWARE

Make sure the system you choose has a growing library of support software, to enable you to realize the full potential of your machine.

KEY POINTS TO LOOK FOR

● High Resolution Colour

In general most home computers have a poor graphics resolution (or detail). Check on the vertical and horizontal resolution in graphic mode and multiply the two numbers together. If the result is less than 35,000, then the graphics can hardly be considered high resolution. Without high resolution graphics displays such as those used in games tend to be "Chunky" in appearance.

● High Quality Sound

Some computers claim to provide a sound channel when in reality all that can be found inside the computer is a small buzzer controlled by electronic pulses. At the very least a sound facility should provide more than one channel and a raise channel as well (for gun shot effects in games for example). The best systems also provide envelope control of the sound channels to produce very sophisticated effects; very important for generating music. Also look for the ability to connect to external amplifiers.

● Keyboard

For accurate entry of programs and data into a computer it is important that the keyboard has a good tactile feel in operation. Coupled with acoustic feedback the user is fully aware when the computer has accepted his/her actions. Also of importance in a keyboard is layout. A standard computer keyboard layout will familiarise the user with the vast majority of computers used in the world of business and professional applications; very important if the purpose of purchasing a computer is educational.

● RAM

One of the most important features of a computer is the amount of RAM, or memory, included. In general the more powerful and exciting a computer program is the more RAM it requires. But take care, all computers are advertised quoting the total RAM used in the system. Computers use up a great deal of their own RAM for storing essential data and particularly in supporting the graphics display and the CPU. If it is less than 32K think again, is it enough?

● Computer Language

It is too difficult to program a computer in its own binary language so high level languages are used, the most popular being BASIC. However, there are a number of BASICs, some being very different from the rest. A de facto standard in the computer industry is Microsoft BASIC. Learn this one and you will be able to program in the majority of computer BASICs; such an important point if a home computer is to be used to educate your children to face the technology of the future.

● Expansion

As your interest and knowledge of computing grows, you will need a



Choosing the right system carefully will save you from throwing your money away. Check full specification, plus peripherals and software prices, before you buy. Preferably choose a Real computer system that can expand to meet your needs.

computer system that will grow with you; able to accommodate Printers, Disk-drives, Joysticks, Communications Modem, and Colour Monitor, as well as produce HI-FI sound effects.

● Software

The computer you choose should have a growing selection of utility

software to make the most of its capability.

Remember, computing is here to stay. You can't learn to compute on a toy, or a device which does not behave like a real computer. In short, look out for a computer which offers all the points above, and you will be sure of getting the best value for money.

To find out which company offers you the right choice, with:-

- Good value, high specification, quality micros.
- A quality, 4 colour, plain paper printer/plotter.
- Communications Modem.
- Micro Disk Drives.
- Comprehensive and growing range of software

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THE HOBBIT



ORIC-1



The Growing System

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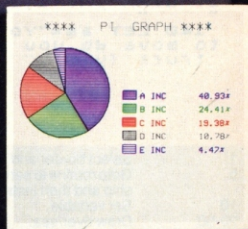


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PCN ProgramCards

Something for the BBC and the Spectrum this week in ProgramCards, plus the continuation of programs from last week's issue.

For the BBC is a short utility for either model (A or B) from Steven McLean, of Liverpool. The routine can be used to search through any Basic program for a string of characters, specified before the search begins. It will then print the line numbers wherever matching strings are found. The routine can be used to find Procedure and Function names, remarks, print strings, data or numbers.

Before the routine is loaded, the main program should be already resident in RAM at the default page for the current filing system (&E00 for *TAPE or &1900 for *DISK). To run the utility, simply enter PAGE=TOP+512 <RETURN> then NEW <RETURN> and then CHAIN the utility.

If you intend to use the utility on a disk system, it is possible to set the PAGE value to &1400 and then CHAIN the utility into

the memory. The author suggests that a user-definable key can be set up to perform the above ie *KEYOPAGE=&1400:MRUN:M. This allows the program to be used frequently, once it has been loaded at &1400.

The program for the Spectrum, from Joseph Donnelly, is for all those Spectrum users who want to be a big wheeler dealer in the financial world.

The game is for two players and each is given a factory, distribution system, and some money. The game takes place over a number of days (in computer time), set at the beginning of the game, and continues until one of the players goes broke or the time is up.

The idea is to buy stock and transport it from your factory, by road, to the Ex Port. Once here it is transferred to a ship which you send across the sea to the In Port. Here the goods are sold, giving you a nice fat profit. As you can see from the picture below, the trucks, ship, river etc, are displayed on the screen and you can keep

track of their current location. This is all fine and quite easy until the dock workers go on strike, increasing your warehouse costs, or somebody waylays your drivers and steals half of the goods he was carrying.

These little snippets tend to set you back a bit and, of course, lose you money.

On the plus side, there is the occasional buyer who is prepared to pay over the odds for your goods, provided that they are at sea and on the way. If you can overcome all of these problems, then you should win the game.

If you have any programs, games or utilities sitting on the shelf at home, or that you have just written, why not send them in to ProgramCards? The more interesting, clever, well-programmed and original, the more we pay for the program. Send your program on either a cassette or disk, preferably with a listing, instructions and comments, to:

Programs Editor, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG.

PCN ProgramCards

Shipment

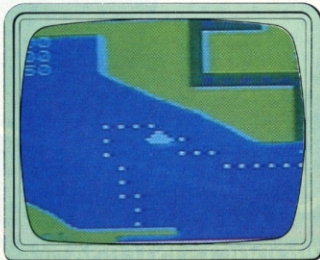
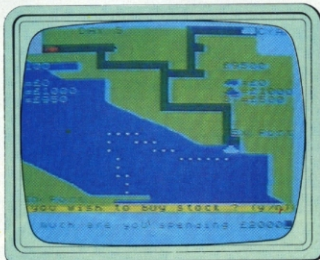
Card 1 of 6

8338SH1/6

```
10 1 BORDER 5: PAPER 1: INK 4: C
15 GO TO 9000
16 LET a=55
17 FOR f=0 TO 104: LET a=a-RND
: PLOT f,3: DRAW 0,-a: NEXT f
18 LET a=155: FOR f=0 TO 104:
: LET a=a-RND: PLOT f,3: DRAW 0,17
: NEXT f
19 FOR f=155 TO 232: PLOT f,3:
DRAW 0,175-a: NEXT f
20 LET a=a-40: FOR f=233 TO 25
5: LET a=a-RND: PLOT f,3: DRAW 0
,175-a: NEXT f
21 PRINT PAPER 4: INK 1: AT 10,
25 "EX PORT": AT 20,2: "IN PORT"
22
90 REM *****
100 PRINT INK 7: PAPER 2: AT 0,0
: "RED ": AT 1,0: " ": AT 2,0:
110 PRINT INK 0: PAPER 3: AT 0,0
0: "CYAN": AT 1,20: " ": AT 2,20:
140 LET a$="You have      places
to move do you wish to #ove your
truck (y/n)?"
```

ZX Spectrum Spectrum Basic

Application: Game
Author: Joseph Donnelly



- 1 Select border and screen colours, clear the screen.
- 5 Goto routine to set up user-defined graphics for truck and ship and then instructions, if wanted.
- 10 Set variable.
- 20-50 Draw river/sea.
- 60 Print in-port and ex-port.
- 100-110 Print the factories.
- 140 Set up a\$, places to move.

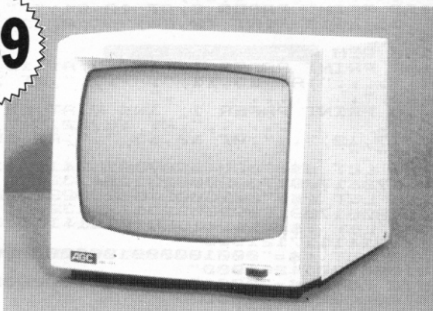
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PCN ProgramCards

Shipment

Card 2 of 6

8338SH2/6

```

150 PRINT PAPER 8; AT 8,28;
    "AT 1,28; "
160 PRINT PAPER 8; AT 8,4;
    "AT 3,28; " "AT 3,18; " "AT 3
    :28;
170 PRINT PAPER 8; AT 4,18;
    " " "AT 6,17;
    "
180 PRINT PAPER 8; AT 7,17; " "A
    T 8,17; " "AT 8,17; "
190 PRINT PAPER 8; AT 10,24; "
    AT 11,24; " "AT 12,24; " "AT 13,
    24;
199 REM *****
200 PRINT PAPER 1; INK 7; AT 12,
    11; " " "AT 13,11; " " " "AT 1
    4,11;
210 PRINT PAPER 1; INK 7; AT 15,
    12; " " " "AT 16,12; " "
    "AT 17,12; " " " "AT 18,13; " "AT 19
    "13;
250 LET d$="0204020702100411041
40417061709170920092311241324"
255 LET e$="0226002400210220052
00519061709170920092311241324"
257 LET f$="1424152215391416131
41213141117121913"
260 LET g$="0001000001000000020
401000000142413001
270 LET c$="00010000010000000002
60100000014241000"
275 DIM h$(36)
280 LET g$="Do you wish to buy
stock? (y/n)"
    
```

```

300 LET i$=" There is 50
# news for you. ....
*****
999 REM *****
1000 FOR l=1 TO 9
1005 IF VAL f$(1 TO 8)+VAL f$(133
    TO 36) <=0 THEN GO TO 1320
1010 IF VAL c$(1 TO 8)+VAL c$(33
    TO 36) <=0 THEN GO TO 1320
1015 PRINT PAPER 4; INK 8; AT 8,8
    "DAY "
1020 FOR t=1 TO 2
1022 PRINT FLASH (t=1); INK 7; P
    APER 2; AT 8,8; "RED " "AT 1,8; "
    "AT 2,8;
1025 PRINT FLASH (t=2); INK 8; P
    APER 5; AT 8,8; "CYAN" "AT 1,8; "
    "AT 2,8;
1030 PRINT INVERSE 8; PAPER 1; I
    NK 4; AT 4,24; "2" "VAL c
    $(1 TO 8)
1040 PRINT INVERSE 8; PAPER 1; I
    NK 4; AT 6,0; "AB=E" "VAL f$(12 TO
    15); " " "INVERSE 1; AT 8,24; "EF
    =E" "VAL c$(12 TO 15);
1050 PRINT INVERSE 8; PAPER 1; I
    NK 4; AT 7,0; "CD=E" "VAL f$(24 TO
    27); " " "INVERSE 1; AT 7,24; "CD
    =E" "VAL c$(24 TO 27);
1060 PRINT INVERSE 8; PAPER 1; I
    NK 4; AT 8,0; "ST=E" "VAL f$(33 TO
    36); " " "INVERSE 1; AT 8,24; "ST
    =E" "VAL c$(33 TO 36);
    
```

- 150-190 Draw roads.
- 200-210 Set colours for ships.
- 250 Define red's road data.
- 255 Define cyan's road data.
- 257 Ships route data.
- 260-300 Player's data and strings.

- 1000 Loop counter 1 is the number of days for game.
- 1005-1010 Check for end of game.
- 1020-1025 t=1 for red player and t=2 for cyan player. Flash appropriate player.
- 1030 Rub out cash balances.
- 1040-1060 Rub out the amount of stock in lorries, ship and factories.

PCN ProgramCards

Shipment

Card 3 of 6

8338SH3/6

```

1055 PRINT PAPER 1; AT 9,8; "
1070 PRINT PAPER 8; INK 2; AT VAL
    f$(17 TO 18); VAL f$(19 TO 20);
    AB"
1075 PRINT PAPER 8; INK 5; AT VAL
    c$(17 TO 18); VAL c$(19 TO 20);
    EF"
1080 PRINT PAPER 1; INK 2; AT VAL
    f$(29 TO 30); VAL f$(31 TO 32);
    CD"
1085 PRINT PAPER 1; INK 5; AT VAL
    c$(29 TO 30); VAL c$(31 TO 32);
    CD"
1100 PAUSE 10; PRINT PAPER 6; IN
    K 0; AT 21,0; g$
1110 IF INKEY$="Y" THEN GO SUB 4
    000; GO TO 4100
1115 IF INKEY$="N" THEN LET e=0;
    GO SUB 4010; GO TO 4100
1120 GO TO 1110
1200 IF RAND<=.7 THEN GO TO 1300
1210 LET x=1; FOR f=1 TO LEN i$;
    PRINT INK 8; PAPER 6; AT 21,0; i$
    (x TO f)
1220 IF f>=32 THEN LET x=x+1; BE
    EP .05,20
1225 NEXT f
1230 RESTORE 9500+INT (RAND*8); R
    EAD #$.h$.i$.j
1232 LET x=1; FOR f=1 TO LEN #$.
    PRINT INK 8; PAPER 6; AT 21,0; #$.
    (x TO f)
1234 IF f>=32 THEN LET x=x+1; BE
    EP .05,25
1236 NEXT f
1240 IF t=1 THEN LET f$(1 TO 8)=
    
```

```

    STR$ (VAL f$(h TO i))
1245 IF t=2 THEN LET c$(1 TO 8)=
    STR$ (VAL c$(h TO i))
1300 NEXT t
1310 NEXT l
1320 CLS : PRINT AT 3,10; "End o
    f game."
1330 LET q=(VAL f$(1 TO 8)+VAL f
    $(33 TO 36))-(VAL c$(1 TO 8)+VAL
    c$(33 TO 36))
1340 IF q>0 THEN PRINT AT 10,8; "
    RED win this time."
1345 IF q<0 THEN PRINT AT 10,8; "
    CYAN win this time."
1350 IF q=0 THEN PRINT AT 10,8; "
    A draw this time."
1360 PRINT AT 10,8; "Another game
    (y/n)"
1365 IF INKEY$="Y" THEN GO TO 92
    00
1370 IF INKEY$="N" THEN STOP
1375 GO TO 1360
3999 REM *****
4000 PAUSE 10; INPUT "How much e
    re you spending f?"; e
4010 IF t=1 THEN LET h$=f$
4015 IF t=2 THEN LET h$=c$
4020 IF e>VAL h$(1 TO 8) THEN LE
    T e=VAL h$(1 TO 8)
4025 LET q=VAL h$(33 TO 36)+e; L
    ET h$(33 TO 36)=STR$ q
4030 LET q=VAL h$(1 TO 8)-e; LET
    h$(1 TO 8)=STR$ q
4032 IF VAL h$(12 TO 15)>0 THEN
    GO TO 4090
    
```

- 1070 Update cash balances.
- 1075-1085 Update the amount of stock in lorries, ship and factories.
- 1100 Print more stock message.
- 1200 Select random number for news flashes or next player's go.
- 1210-1225 Scroll news flash message across bottom of screen.
- 1230 Select random message.
- 1232-1236 Scroll message across screen.
- 1240-1245 Alter player's assets.

- 1300 Next player's go.
- 1310 Next day.
- 1320 Print end of game.
- 1330-1350 Get final values and winner.
- 1360 Prompt for another game.
- 4000 Amount to spend.
- 4010-4015 Get appropriate amount into h\$, the calculating string.
- 4020-4030 Check money and stock levels.
- 4032 Check lorry contents.

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PCNProgramCards**City Defense Card 2 of 5**

8338CD2/5

```

125 U=0:V=0:CURSETX,Y,3:CHAR43,0,1
130 MUSIC2,6,10,0:PLAY2,0,1,200
135 FORA=0T09:CURSETA(A),0,3:DRAWC(A),20,1:NEXT
140 FORT=1TOR1:GOSUB150:NEXT
145 GOSUB250:GOTO300
150 K#=KEY#:I=X:J=Y
155 IFK#="" THEN200
160 IFK#="" THEN165ELSEM=ASC(K#)
165 IFM=8THENX=X-7:IFX=8THENX=225
170 IFM=9THENX=X+7:IFX=232THENX=15
175 IFM=10THENY=Y+5:IFY=155THENY=150
180 IFM=11THENY=Y-5:IFY=5THENY=10
185 IFMP=0THENCURSETI,J,3:CHAR43,0,2
190 MP=0:CURSETX,Y,3:CHAR43,0,2
195 RETURN
200 IFMI=0THENRETURN
205 MP=1:MI=MI-1
210 CURSETMI*6+45,180,0:CHAR109,0,0
215 IFMI=5THEN CURSET0,180,3:FILL8,1,12
220 Z=Z+1:E(Z)=X:F(Z)=Y
225 CURSETX,Y,3:CHAR43,0,1:RETURN
250 IFZ=0THENRETURN
255 FORA=1TOZ
260 FORB=1TO2:CURSET120,160,3:DRAWC(A)-118,F(A)-157,2:NEXTB
265 MUSIC1,3,7,0:PLAY1,1,2,600
270 FORC=1TO2STEP-1
275 FORD=1TO7:CIRCLED,C:NEXTD,C,A
280 CURSETX,Y,3:CHAR43,0,1:MP=0
285 Z=0:K#=KEY#:RETURN

```

125-135 Start attack.
 150-195 Get key from keyboard and act upon it.
 200-225 Routine for curset missile, line 215 sets a flashing attribute.
 250-285 Routine for firing a missile.

PCNProgramCards**City Defense Card 3 of 5**

8338CD3/5

```

300 U=U+1:Q=U*20
305 IFU<6ANDRND(1)>.95THENGOSUB600:IFDH+TH>4THEN415
310 FORA=0T09
315 IFD(A)=1THEN335
320 P=A(A)+U*C(A)
325 IFPOINT(P,Q)=0THEND(A)=1:V=V+1:GOTO335
330 CURSETP,Q,3:DRAWC(A),20,1
335 NEXT
340 IFV=10THEN400
345 IFU<7THEN140
350 FORA=0T09
355 IFD(A)=1THEN370
360 CURSETA(A)+8*C(A),165,1:DH=DH+1
365 GOSUB700:WAIT10
370 NEXT
400 CURSET0,0,0:FILL160,1,0:CURSET0,0,0:FILL160,40,64
405 K=K+1:IFK=2THEN415
410 IFTH+DH<5THEN90
415 FORA=180T0187:CURSET12,A,0:DRAW200,0,0:NEXT
420 CLS:IFTH+DH>4THENPRINT"NO SURVIVALBONUS":GOTO445
425 PRINT:IFMI=0THEN440
430 SOUND1,234,0:FORA=1TOMI:PRINT"m";:PLAY1,0,1,100:WAIT10:NEXT
435 PRINT"X ";25;"=" ";MI*25
440 PRINT"SURVIVALBONUS: 250";:SC=MI*25+250

```

300 Step attack counter, Y coordinate for attack position.
 305 Extra attack.
 3108335 Check for attacks stopped, display the next step of attack lines.
 340 Check number of attacks stopped.
 345 Check the number of attack steps.
 350-370 Display hits on city.
 400 Clear screen above city.
 405 Check first or second attack.
 410 Start second.
 415 Clear missiles.
 420-470 Display the score and hits.

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PCNProgramCards**City Defense Card 4 of 5**

8338CD4/5

```

445 PLAY1,0,1,250:WAIT400:CLS
450 PRINT"ROUND ";R:PRINT"SCORE: ";SC
455 PRINT"DIRECT HITS: ";DH;:WAIT400
460 TS=TS+SC:TH=TH+DH:CLS
465 PRINT"TOTALSCORE: ";TS
470 PRINT"TOTAL DIRECT HITS: ";TH
475 CURSET0,180,3:FILL8,1,8
480 WAIT400:IFTH<5THEN55
500 CURSET120,150,0:MUSIC2,3,5,0:PLAY2,2,2,10000
505 FORA=1TO40:CIRCLEA,1:NEXT
510 PLAY2,2,1,10000:FORA=40TO1STEP-1:CIRCLEA,0:NEXT
515 CURSET65,75,0:FILL8,1,12
520 IFTS>HSTHENHS=TS:N#="NEW HIGH SCORE":GOTO530
525 N#="GAME OVER"
530 CURSET75,75,0:GOSUB750
535 CURSET75,90,0:N#="ANOTHER TRY? Y/N":GOSUB750
540 GETA#:IFA#="Y"THEN30
545 IFA#<"N"THEN540
550 TEXT:PRINTCHR$(6):END
600 ES=2:EX=INT(RND(1)*40+100):EY=0
605 CURSETEX,EY,3
610 IFES=1THENSOUND1,60,1:ES=2:GOTO620
615 ES=1:SOUND1,60,4:PLAY1,0,0,0
620 IFEX<XTHENDRAW-10,20,1:EX=EX-10:GOTO630

```

```

475 Clear flashing attributes for missiles.
480 Check for next attack round.
5008510 Display end explosion.
515-530 Display game over and high score.
535-545 New game or end prompt.
550 End.
600-650 Routine for extra attack.

```

PCNProgramCards**City Defense Card 5 of 5**

8338CD5/5

```

625 DRAW10,20,1:EX=EX+10
630 EY=EY+20:IFEY=160THENCURSETEX,165,3:GOSUB700~DH=DH+1:RETURN
635 FORT=1TO12:GOSUB150:NEXT
640 GOSUB250
645 IFPOINT(EX,EY)=-1THEN605
650 RETURN
700 MUSIC2,5,6,0:FORB=2TO1STEP-1
705 PLAY2,2,8,1000:FORC=1TO10
710 CIRCLEC,B-1:NEXTC,B
715 RETURN
750 FORA=1TOLEN(N#),0,1
755 CHARASC(MID$(N#,A,1)),0,1
760 CURMOV6,0,0:NEXTA:RETURN
1000 CLS:PAPER7:INK5:FORA=1TO2
1005 PLOT1,A,10:PLOT12,A,"CITY DEFENCE":NEXT
1010 PLOT1,5,"STOP ENEMY-ATTACK ON THE CITY."
1015 PLOT1,8,"YOU HAVE 25 MISSILES EACH ATTACKROUND."
1020 PLOT1,11,"USE CURSOR CONTROL KEYS FOR CURSOR-"
1025 PLOT1,13,"MOVEMENT AND CURSET WITH SPACEBAR."
1030 PLOT1,16,"AFTER 5 OR MORE DIRECT HITS ON THE"
1035 PLOT1,18,"CITY, YOU ARE FORCED TO SURRENDER."
1040 PLOT1,25,"PRESS ANY KEY TO START."
1045 GETA#:RETURN
2000 FORA=46912TO46959
2005 READRC:POKEA,RC:NEXT:RETURN
2010 DATA12,12,28,28,28,28,28,28,0,0,6,6,31,31,31,31,0,12,12,12,15,
15,15,15
2020 DATA0,0,0,0,0,0,60,60,63,63,63,63,63,63,0,0,8,8,8,8,28,8,20,0

```

```

700-715 Routine to display attack on city.
750-760 Routine for plotting characters in HIRES.
1000-1045 Instructions.
2000-2020 Redefine characters.

```


PCNProgramCards

Monitor 64

Card 3 of 8

Commodore 64/CMB Basic/Martin Lightfoot/cont'd

8338MO3/8

```

700 REM*****
701 REM   CONVERT DECIMAL TO HEX
702 REM*****
705 T=H:H$=""
710 H$=CHR$(FNHEX(T-INT(T/16)*16))+H$:T=INT(T/16)
715 IFT>0THEN710
720 RETURN
800 REM*****
801 REM EXECUTE MACHINE CODE PROGRAM
802 REM*****
805 IFMID$(CO$,2,1)<>" "THEN500
810 IFLEN(CO$)<>6THEN500
820 H$=RIGHT$(CO$,4):GOSUB600:IFH=-1THEN500
830 SYSH:GOTO200
1000 REM*****
1001 REM   DISPLAY MEMORY ON SCREEN
1002 REM*****
1005 IFLEN(CO$)<>11THEN500
1010 IFMID$(CO$,2,1)<>" "THEN500
1020 CO$=RIGHT$(CO$,9):H1$=""
1025 IFMID$(CO$,5,1)<>" "THEN500
1030 H1$=LEFT$(CO$,4)
1040 H2$=RIGHT$(CO$,4)
1110 H$=H1$:GOSUB600:IFH=-1THEN500
    
```

700-720 Convert the decimal number in H to a hex number in H\$.

800-830 Run machine code program starting at address contained in H.

1005 Check length of CO\$=11. If not then jump to line 500.

1010 Check the second character of CO\$ for space. If not then jump to line 500.

1020 Removes the first and second characters of CO\$. Checks if first character of CO\$ is a space, if not then jump to line 500.

1030-1040 Splits CO\$ into two.

PCNProgramCards

Monitor 64

Card 4 of 8

8338MO4/8

```

1120 A1=H
1130 H$=H2$:GOSUB600:IFH=-1THEN500
1140 A2=H
1150 IFA2<=A1THEN500
1155 PRINT:PRINT
1160 FORJ=A1TOA2STEP8
1170 H=J:GOSUB700:PRINT"J."H$";:I=0
1180 H=PEEK(J+I):GOSUB700
1185 IFLEN(H$)=1THENMH$=""H$
1190 PRINT" "H$:GETR$:IFR$=""THENJ=A2:GOTO1210
1200 I=I+1:IFI<8THEN1180
1210 PRINT:NEXTJ
1220 GOTO200
2000 REM*****
2001 REM   MEMORY SAVE ROUTINE
2002 REM*****
2003 SS=0
2005 NA$="" : IFMID$(CO$,2,1)<>CHR$(34)THEN500
2010 CO$=RIGHT$(CO$,LEN(CO$)-2)
2020 FORG=1TOLEN(CO$)
2030 IFMID$(CO$,G,1)=CHR$(34)THENF=G:G=LEN(CO$):
    GOT02050
2040 NA$=NA$+MID$(CO$,G,1)
2050 NEXT
    
```

1150 Check to see if the second address is smaller than the first.

1160-1220 Display the required memory onto the screen, in rows of eight.

2000-2005 Checks to see if the second character of CO\$ is a quote.

2010 Knocks off the first and second characters of CO\$.

2020-2050 Removes the file name between quote marks and stores it in NAS.

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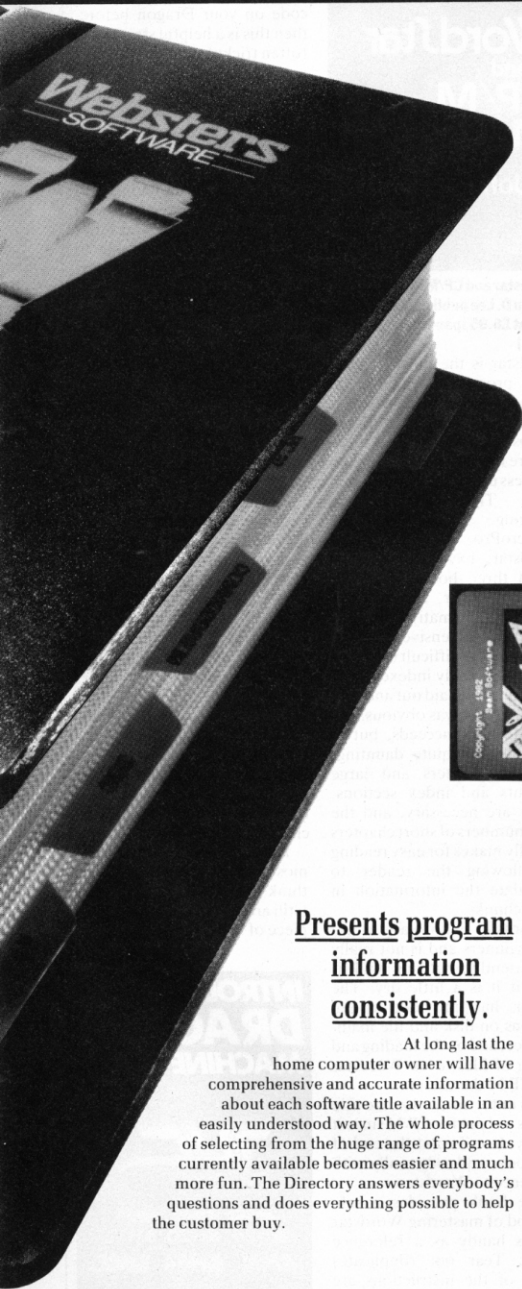
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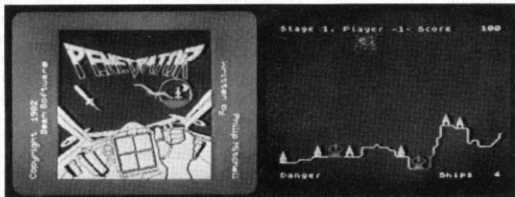


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The first edition of the Directory contains 240 pages, each showing details of one software title. By the time the second update takes place in early 1984, the total will have risen to 400 pages. From then on, each copy of the Directory will be updated quarterly so that, at all times, in your store, consumers will be able to find all the information they need about personal computer software. There simply isn't a better or more effective way of showing the consumer what each program offers.

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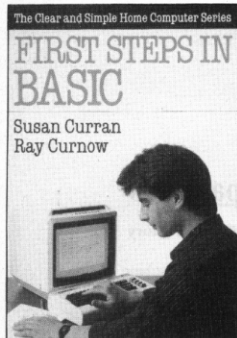
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68) 4152.

Which book would your micro want you to buy? PCN's review page helps you choose.



'First steps in Basic' by Susan Curran and Ray Curnow, published by Windward at £4-95 (paperback, 192 pages).

This book is lucid, well laid out, and thoroughly useful. Since it starts in immediate mode, with the Print statement, it enables the beginner to experiment with the language and the computer without needing to know about more complicated matters such as programs and variables. These, sensibly, are not introduced until after the first chapter.

The book is machine independent, relying on a simplified form of Microsoft Basic to achieve this. Any adaptations that are needed (and they appear to be few and far between) are not difficult to implement. Sensible appendices on different Basics, and the language used here, facilitate this.

Progress is rapidly made to programs and variables. The latter are dealt with almost *too* thoroughly, but once the knowledge has been gained it is useful later on. The book subsequently moves on to loops, branching, editing, debugging, data and longer programs. The grounding given provides a basis from which to learn any programming language.

I think that it is a pity that flowcharts were used rather than structured diagrams, especially since the book advocates structured programming. The only structured diagram shown is used to illustrate structured programming ideas.

First Steps in Basic is an excellent book, whether you are just beginning to use your micro for programming or you are just about to buy one. Recommended.

PL

'Dynamic Games for your TI-99/4A' by Scott Vincent, published by Interface at £4.95 (paperback, 159 pages).

Well, well well; another book of type-them-in-yourself programs, this time for the TI-99/4A. The 30 programs in the book include the usual crop of golf, draughts, landers, and guessing games, though most of them have been retitled.

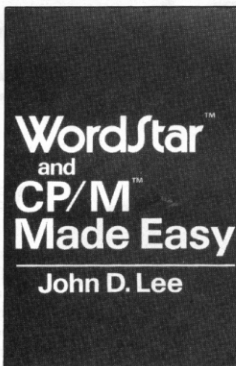
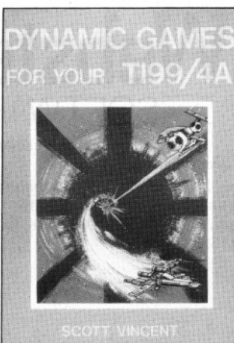
The book is laid out as a series of chapters, each one beginning with an introduction which sets the scenario for the following game. Next comes the instructions on how to play the game, *ie* which keys to press and which parts of the screen to look at. After this section you sometimes get notes on how the program operates, I say sometimes because, unfortunately, not all of the programs are documented in this way.

The games are generally of the interactive genre, that is they entail you chasing around the screen, or memory in the case of the adventures, zapping and dodging your various enemies and opponents.

At last we come to the listings. These look as though they have been printed on the ubiquitous dot-matrix printer. This suggests programs were first run on the TI and, once perfected, were printed out. Because of this there should be as few bugs as is humanly (and machinely) possible. The listings are legible and are generally short.

This is a worthwhile book if you have just obtained a TI-99/4A and are looking for a source of programs to get you started. But anyone who has had the machine for any length of time will probably have seen or written most of the programs.

KG



'Wordstar and CP/M Made Easy' by John D. Lee published by Wiley & Sons at £6.95 (paperback 223 pages)

Wordstar is the most popular word processor available on microcomputers. That it is mostly unavailable on home micros is a reflection that there is more money to be made from business users rather than home users. This, however, is changing.

MicroPro, the maker of Wordstar, have already produced three books about its word processor, but the best and most informative of these, the comprehensive User's Guide, is very difficult to understand and poorly indexed. The need for a well laid out and well indexed book was obvious.

This book succeeds, but at first it seems quite daunting, with 45 chapters and large contents and index sections. These are necessary, and the large numbers of short chapters actually makes for easy reading by allowing the reader to assimilate the information in small chunks.

Wordstar is not easy to use for beginners and is not really user-friendly, but this book is even if it is a little dry. The author has provided useful sections on disk and file maintenance, and on the loading and saving of files, even Wordstar and CP/M themselves.

It is unfortunate that the title makes a claim for CP/M since it is only described at the end of the book, and only really with reference to Wordstar.

The book provides a safe method of mastering Wordstar and is handy as a reference guide. Tear out (duplicate) pages of the instructions are available.

PL

'Introducing Dragon Machine Code' by Ian Sinclair published by Granada at £7-95 (paperback, 151 pages).

If you haven't used machine code on your Dragon before, then this is a helpful start to the (often tricky) subject. The only real worry is that, by the time you're really getting to grips with the 6809, the book is more a source of frustration and less one of enlightenment. However, once you've read this book, you'll be able to understand most of the available books on 6809 programming, and more importantly you'll be able to understand them with reference to your Dragon.

The sections of the book dealing with how to get into machine code at all, and on how to get the best from your Dragon, are very good. The will get you to the point of seeing what a machine code routine looks like, and towards getting them out of magazines and books and into your machine.

The very fact that the book becomes increasingly frustrating is a tribute to the way the author takes the reader, step by step, into machine code. By the time you've finished the book you will be eager to get into some of the more technical, and until you've read this less accessible books on the 6809 assembler.

However, this is the first book that I've seen about machine code which is very instructive on how to use it on the Dragon. Many machine code books are too 'head in the clouds' for home users.

A little more expensive than most computing books, but I think good value for money (still around the same price as a piece of software).

PL



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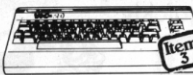
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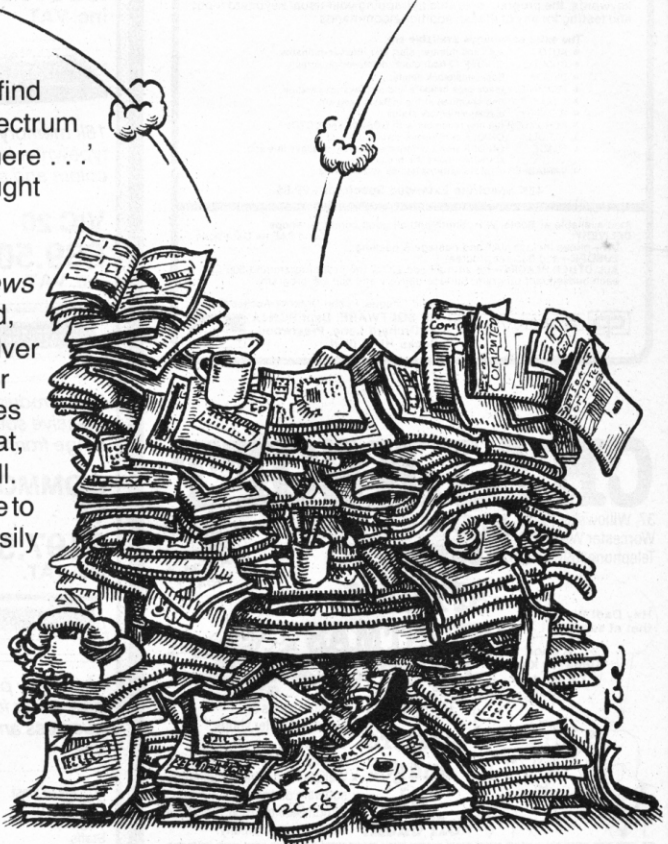
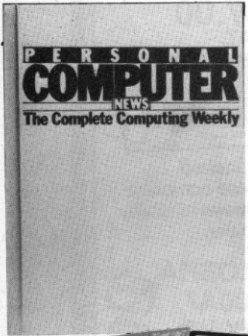
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DATABASES

This six-page guide lists as many of the micros on the market for under £12,000 as possible. In Databasics you'll find all the specifications for the machines, add-ons and software necessary to make your buying decisions.

PCN keeps you up to date in three-week cycles, starting with hardware, then peripherals and finally software.

PRICE Specifications listed for each machine indicate what you get for the basic price quoted, which includes VAT.

PROCESSOR TYPE A microprocessor is the heart of the computer. The Z80 and 6502 are popular 8-bit chips. The 8088 and 68000 are common 16-bit chips. If a machine has an 8-bit and a 16-bit processor we have listed the 16-bit only. Cust. means custom-built.

SPEED IN MHZ Speed of the clock used to drive the microprocessor, measured in MegaHertz (million cycles per second).

STANDARD RAM Amount of main memory used on the system. The capacity is expressed in kilobytes.

MAX RAM normally at extra cost Amount of memory to which the system can be expanded.

MAX CHARACTERS columns × lines The number of characters that can be displayed across the screen and the number of lines down.

METHOD (at extra cost) This indicates the way the computer displays information. **M** on its own means that a monitor is included in the basic price. **Tv** indicates that you can plug the computer into a television set. **(M+)** indicates that the monitor costs extra. **LCD** = Liquid crystal display.

COLOUR CAPABILITY tells you whether the machine can give colour at the basic price quoted.

MAX DOT RESOLUTION gives the maximum number of points across the screen by the number of points down the screen that are available for graphics.

KEYBOARD This tells you the type of keyboard that comes with the machine. **W** = word processing, **C** = calculator and **T** = touch-sensitive.

No OF FUNCTION KEYS refers to the number of keys that can be used for different jobs by different programs.

NUMERIC PAD indicates whether the machine has a separate calculator-style group of number keys to enter data quickly.

INTERFACES BUILT-IN shows the number of standard connections built into the machine.

CASSETTE FACILITY gives a yes or no as to whether or not the machine can use a cassette to store data.

CAPACITY PER DISK AND DISK SIZE tells you how many disk drives come with the machine, and the amount of data in kilobytes (K) or megabytes (Mb) that can be stored on each drive. There are two sizes for disks, 5¼" or 8", and they can be floppy (F) or hard (H).

OPERATING SYSTEM gives the program that looks after the general running of a computer.

LANGUAGES INC is a column which lists the programming languages that come with the machine at the basic price.

OTHER LANGUAGES AVAILABLE indicates whether or not other programming languages are available for the machine.

DISTRIBUTOR T to find which company distributes the machine refer to the distributor table from the code listed in this column. The table is at the end of the listings, and gives the distributor's name and telephone number.

All details given are the latest available. We ask distributors to let us know as soon as machine specifications change so Databasics can be kept right up to date. This guide has been meticulously researched and the information collected from individual distributors listed.

PRICE GUIDE

Sinclair ZX81	£40	Powertran Cortrex	£454	Osborne I	£1,581	Country Computers C3000	£2,242	Britannia Baby	£2,657	Citer Series 1	£3,214	Altos 800/15	£5,663
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Casio FX702P	£90	Commodore 500	£799	Grundy 101	£1,850	CAL PC	£2,294	Sirius I	£2,754	Digico Prince	£3,392	Sage IV	£5,962
Sinclair Spectrum	£99	Tandy Model 4	£861	Grundy 8200	£1,860	North Star Horizon	£2,294	Victor 9000	£2,754	OEM Orion	£3,392	Rair Business Computer	£6,037
Tandy TRS-80 Pocket 2	£99	HP 75C	£883	Genie II	£1,897	Sanyo MBC 1250	£2,294	North Star Advantage	£2,766	Barcellos AMT 100	£3,450	Digital Microsystems 4	£6,210
Commodore VIC-20	£130	Sharp MZ80B	£900	Toshiba T-100	£1,900	Casu Mini C2	£2,300	Apple II	£2,780	Kalamazoo 1050	£3,450	Superstar	£6,296
Atari 400	£149	Franklin Ace	£914	Sord M23	£1,932	Seed System I	£2,300	Sanyo MBC 4050	£2,817	Digital Microsystems 3	£3,576	Rascal 6000	£6,327
Sord M5	£150	Apple IIe	£972	Kaypro II	£1,949	Sharp PC3201	£2,300	Bonsai SM 4000	£2,842	Televideo TS 1602-C	£3,714	Eagle 1600	£6,497
Atari 600XL	£160	Mupid 320 GB	£978	Krypton 800 range	£1,949	HP 85	£2,360	Logical VT5 Vitesse	£2,863	Adcs Multivision	£3,714	TI System 200-250	£6,695
Colour Genie	£168	Husky Hunter	£997	Kenilworth 83G	£1,953	HP Series 100, 120	£2,362	Decision-1 Computer O11	£2,869	Clenio Pronto	£3,795	Compucorp 675	£6,780
Sharp PC1500	£169	Commodore 8032	£1,129	Transam Truscan	£1,983	Sord M23P	£2,369	Olivetti M20	£2,869	Panasonic JD800M	£3,795	Wicat 150	£6,846
Dragon 32	£174	Commodore 710	£1,144	NCR Decision Mate V	£1,983	TI Prof. Computer	£2,386	DMS Fox	£2,875	Kemiltron K3000	£3,795	Sundance I	£6,969
Texas CC40	£180	Microdecision	£1,129	Epson QX10	£1,985	IBM PC	£2,392	Eagle III	£2,950	DEC PC 350	£3,850	Pascal Mod. Microengine	£7,003
Tandy TRS 80 colour	£180	Tulip 1	£1,150	IDS Datamachine	£1,995	Xerox 820 Model II	£2,415	Zenith ZF-120-22	£2,978	Victor 4	£3,852	Diablo 3000	£7,250
Mattel Intellivision	£190	Fujitsu FM8	£1,150	Tandy TRS-80 Model II	£1,999	Haywood 3000	£2,439	Monroe EC 8800	£2,990	Cifer Club	£3,852	Onyx 5001 MU	£7,607
Electron	£199	Sanyo MBC 1000	£1,195	Kenilworth 83N	£2,012	LSM4	£2,472	Philips P3500	£3,000	Sage II	£4,019	Apple Lisa	£7,653
Computers Lynx	£225	Pied Piper	£1,226	Caltext Micro	£2,019	Canon CX-1	£2,500	Tanberg EC10	£3,000	Tandy TRS-80 Model 16	£4,199	Sundance II	£8,205
Commodore 64	£229	Protron 900	£1,259	Minstrel	£2,059	Sirius I	£2,525	Archives 1	£3,003	IBM PCXT	£4,258	Haywood Hinet	£9,550
Sharp MZ700	£250	Tandy TRS-80 Model III	£1,259	Portico Miracle Portable	£2,064	IO Tech Iona	£2,539	Archives 1	£3,003	Hytech H4500	£4,310	Altos 856-10	£9,631
Atari 800XL	£250	Cromemco C10	£1,350	LSM3	£2,064	HP 87XM	£2,571	Wang Professional	£3,076	BMCOK 11 F800, Model 20	£4,360	Micro Five 3000	£10,350
New Brain A	£269	Commodore 8096	£1,374	Haywood 9000 Composite	£2,064	Quantum 2000	£2,587	DECPC 325	£3,080	ADS 42	£4,500	Sundance 16	£10,480
Genie II	£299	NEC PC 8001	£1,375	Positron 9000	£2,134	Ajile	£2,589	Direct 1000	£3,093	Televideo TS-802H	£4,533	Spectrum	£11,442
Atari 800	£300	Pasca 640	£1,437	Research Machines 380Z	£2,147	CP 1100	£2,633	Equator	£3,099	Country Computers C1000	£4,542	ABBREVIATIONS	
Nascom 2	£327	NEC PC8000	£1,454	Superbrain JR	£2,150	Canon AS100	£2,630	Hyperion	£3,100	Conus Concept	£4,887	Ap: APL	Cm: Comal
Microtan 65	£369	Signet 2	£1,483	Future Computers FX-20	£2,156	Seed System 19	£2,630	Clenio Table-Tops 925	£3,105	Verus Five 1000	£5,175	As: Assembly	Ft: Fortran
BBC Model B	£399	Magnam	£1,489	CWP Cortex	£2,179	Enterprise 1000	£2,645	ITT 3030	£3,105	Fortune 32:16 System 2	£5,204	Bas: Basic	Fm: Fortran
Sharp MZ80A	£399	Televideo TS-800 Series	£1,495	Comat Communicator	£2,180	Facit 6520	£2,645	Monroe OC 8810	£3,162	Zeus 4	£5,400	Co: Cobol	Pa: Pascal
Datac Micro Controller	£431	HP86A	£1,570	Adler Alphatronic P2	£2,197	Olympia Boss Model A	£2,645	HP Series 200 Model 16A	£3,211	Molecular M200	£5,462		

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard ROM	Max RAM — normally at extra cost	Display		Graphics	Keyboard		Interfaces built-in				Storage		Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters columns × lines	Method (at extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others					

HARDWARE

ACT Apricot	£1,719	8086A	5	256K	768K	80×25	LCD	800×400	W	8	●	1	1		2	2×315K3¼F	MSDOS	Ba	●	A7	PCN issue 37	
Adds Multivision	£3,795	8085A	5	64K	256K	80×25	M	640×240	W	28	1	1	1			1×350K5¼F	CP/M2.2, Muon	Ba	●	A2	Multi user system	
Adler Alphasonic P2	£2,197	8085A	3	48K	64K	80×24	M		W	6	●	2		1	3	2×320K5¼F	CP/M	Ba	●	T1	£327 buys extra storage	
Adler Alphasonic P3	£2,696	8085A	3	64K		80×24	M		W	6	●	2		1	3	2×790K5¼F	CP/M	●	T1	16 bit option-promised		
Ajile	£2,599	8088	4	256K		80×25	M	640×250	W	10	●	1	1	2		2×320K5¼F	MS-DOS	BaAs	●	A9	PCN issue 13	
Almarc 801	£2,708	Z80	4	64K	512K	80×25	(M+)	●	W			2		11		2×800K5¼F	CP/M	●	A4	8-bit range goes to 20Mb		
Almarc 1601	£3,445	8086	8	128K	1Mb	80×25	(M+)	●	W			2		11		2×800K5¼F	CP/M86	●	A4	Pseudo 16-bits go to 20Mb		
Aquarius	£68	Z80A	4	4K	52K	40×24	TV	●	320×192	C				1	●		Cassette	Ba	●	M7	PCN issue 7	
Altos 800/15	£5,663	Z80	4	192K	208K	80×24	M		W	8	●	1				1×450K5¼F	MP/M	●	L1	Multi user business machine		
APL Signet	£1,610	Z80A	4	64K		80×25	Tv(M+)	●				2				2×188K5¼F	APL, CP/M	Ap	●	M1	*APL terminal recommended	
Apple II	£776	6502	1	48K	128K	40×24	Tv(M+)	●	256×192	W				8	●		CP/M, DOS 3.3, UCSD-P	Ba	●	A8	Plenty of software and extras	
Apple IIe	£972	6502	1	48K	128K	40×24	(M+)	●	256×192	W							DOS	Ba	●	A8	Updated Apple II	
Apple III	£2,780	6502	2	128K	256K	80×24	(M+)	●	560×192	W	●	1		4		1×140K5¼F	SOS, DOS	●	A8	Will emulate Apple II		
Apple Lisa	£9,775	68000	8	1Mb		120×30	M	792×360	W	●	2	1		3		2×860K5¼F	Lisa	●	A8	PCN issue 1		
Archives I	£3,003	Z80	4	64K		80×25	M	240×100	W	23	●	2	1	1	5	2×386K5¼F	CP/M	●	S1	Standard CP/M + graphics		
Atari 400	£150	6502B	1.79	16K		40×24	Tv	●	320×192	T	3			7	●		Cassette	Ba	●	A5	Games computer	
Atari 800	£300	6502	1.8	48K		40×24	Tv(M+)	●	320×192	W	3			7	4	●	Cassette	Ba	●	A5	Versatile, good graphics	
Atari 600XL	£160	6502C	1.79	16K	64K	40×24	(M+)	Tv	●	320×192	W	5		4	1	●	1×127K5¼F	DOS 2	Ba	●	A5	Dos 3 available 1984
Atari 800XL	£250	6502C	1.79	64K		40×24	(M+)	TvM	●	320×192	W	5		4	1	●	1×127K5¼F	DOS 2	Ba	●	A5	256 colours, 128 at any one time
Barcelos AMT 100	£3,450	Z80A	4	64K	256K	80×24	TvM		W	8	●	1	1	2	3	2×500K8F	CP/M	BaCo	●	B1	Up to four users	
BASF 7100	£5,805	Z80A	4	64K		80×24	M		W	26	●	1	1			3×163K5¼F	BOS	Ba	●	C1	Hard disk promised	
Basis 108	£1,683	6502	1	64K	126K	80×24	TvM	●	820×168	W	15	●	1	1	6	●		●	C12	Apple bus, Z80, 80 columns		
BBC Micro Model B	£399	6502	2	32K		80×30	Tv(M+)	●	640×256	W	10			1	5	3	●	MOS	BaAs	●	A1	PCN issue 3
BMC OKI 800, Model 20	£4,360	Z80B	5	64K	256K	80×25	M	●	640×200	W	15	●	1		●	2×340K5¼F	CP/M	Ba	●	E1	Built-in printer	
Bonsai SM 3000	£2,294	Z80	2	64K		80×24	M	80×24	W	14	●	1	1			2×350K5¼F	CP/M	●	B2	CP/M business machine		
Bonsai SM 4000	£2,842	8088	5	128K	256K	80×24	M		W	14	●	1	1				CP/M, MP/M, MS-DOS	●	B2	Z80 for 8 bit software		
Britannia Baby	£2,657	8085	6.14	64K		80×25	Tv(M+)	80×25	W	11	●	2	1			2×500K5¼F	CP/M	AsBaCo	●	B3	Cobol language included	
British Micro Mini 803	£1,490	Z80A	4	64K		80×25	(M+)	512×256	W	17	●	1	1	1		2×400K5¼F	OS/M	●	B4	This is CP/M compatible		
CAL PC	£2,294	8088	5	128K	256K	80×25	TvM	●	256×512	W	●	2	1	1	5	2×400K5¼F	CP/M	Ba	●	C3	Also Z80B Processor	
C-Base 64A	£401	6502	1	64K	192K	40×24	Tv(M+)	●	256×192	W	51	●		8	●		CP/M, DOS 3.3, UCSD-P	Ba	●	W3	Apple II compatible	
Caltext Micro	£2,019	Z80A	4	64K	256K	80×24	TvM		W	36	●	1	1	3		2×400K5¼F	CP/M	●	C3	Range of software included		
Computers Lynx	£225	Z80A	4	48K	192K	40×24	Tv(M+)	●	248×256	W			1	1	●		CP/M	Ba	●	C5	Also 128K with CP/M	
Canon AS100	£2,633	8088	4	128K	512K	80×25	M	●	640×400	W	12	●		1	4	2×640K5¼F	●	C4	Choice of CP/M86 or MS-DOS			
Canon CX-1	£2,500	6809	4	128K	256K	80×24	M	80×25	W	15	●	3	1	1	2	2×320K5¼F	MCX	BaAs	●	C4	Pascal, Fortran as extras	
Casio FX 702P	£90	Cust.		2K		20×1	LCD		C								Cassette	Ba	●	C6	Pocket computer	
Casio PB100	£50	Cust.		0.7K	1.7K	60×1	LCD		C	●							Cassette	Ba	●	C6	Business pocket computer	
Casu Mini C Mark 2	£2,300	Z80A	4	64K			(M+)					4	1	6		2×1Mb8F		●	C7	*Choose your own terminal		
Cifer Series 1	£3,214	Z80	4	128K	320K	132×32	TvM		W	40	●	3	1			2×800K5¼F	CP/M	●	C17	Other models available		
Cifer Club	£3,904	Z80A	4	64K	256K	80×24	M	1024×300opt	W	20	●	3	1	1		1×800K 5¼F	CP/M, MP/M opt, UNIX opt	●	C17	Optional 68000 processor		
Clenlo Pronto	£3,795	Z80A	4	64K	1Mb		Tv(M+)					2	2	18		2×600K8F	CP/M	Ba	●	C8	*Choice of terminal	
Clenlo Table-Top 925	£3,105	Z80A	4	64K	128K	80×25	M		W	11	●	2	2			2×600K8F	CP/M	●	C8	Watch out for the weight		
Columbia PC1600-1	£3,392	8088	4.77	128K	1Mb	80×24	M	●	640×200	W	10	●	2	1	8	2×320K5¼F	CP/M, MS-DOS	Ba	●	I1	An IBM lookalike	
Commodore VIC 20	£140	6502	1	5K	32K	22×23	Tv(M+)	●	176×158	W	8				3	1	●	CP/M, MS-DOS	Ba	●	C9	Very popular home micro
Commodore 64	£229	6510	1	64K		40×25	Tv(M+)	●	320×200	W	8							Ba	●	C9	PCN issue 24	
Commodore 4016	£632	6502	1	16K	32K	40×25	TvM		W	●			1	3	3		Cassette, PETDOS	Ba	●	C9	The original PET	
Commodore 700	£1,144	6509	2	128K	896K	80×25	TvM		W	10	●	1	1	2	1	●		Ba	●	C9	PCN issue 5	

Commodore 8032	£1,129	6502	1	32K	96K	80x25	TvM		W	●		1	1	●		Cassette, PETDOS	Ba	●	C9	The 80-column PET			
Commodore Super Pet 9000	£1,719	6502	2	96K		80x25	TvM		W	●	1	1	1	2	●	Cassette, PETDOS	Ba	●	C9	Top of the range			
CompuCorp 675	£6,780	Z80	4	64K	256K	80x20	M		W	20	●	1		4		2x655K5/4F	CompuCorp	●	C10	Unusual O/S			
CompuStar	£5,837	Z80A	4	64K		80x25	M		W	●	2					1x10Mb8H+1x350K5/4F	CP/M	Ba	●	I10	Networking system		
Cornart Communicator CP100	£2,180	Z80	4	64K	512K	80x24	M		W	●	2	1		10		2x390K5/4F	CP/M		●	C13	Business CP/M micro		
Corona PC1	£2,697	8088	5	256K	512K	80x24	M	●	640x320	W	1	●	1	1		2x144K5/4F	CP/M	Ba	●	N1	Price includes twin disk drive		
Corvus Concept	£4,887	68000	8	256K	1Mb	120x60	M		720x560	W	10	●	2		1	4	Merlin	Pa	●	K1	A4 shaped screen		
Country Computers C1000	£4,542	6502	4	64K	128K	80x24	M		280x192	W	12	●	1		3	1x10Mb5/4H+1x140K5/4F	DOS, CP/M	Ba	●	C16	Runs all Apple software		
Country Computers C3000	£2,242	Z80A	4	64K	256K							1	1			1x5Mb5/4H+1x500K5/4F	CP/M		●	C16	*Terminal own choice		
CP1100	£2,639	8086	6	128K	1Mb		(M+)*					2	1		7	2x390K5/4F	CP/M 86		●	C13	Choose your own terminal		
Cromemco System 1	£3,025	Z80	4	64K		80x24	(M+)	●	450x735	W	20	●	1		8	2x390K5/4F	CDOS, Crom		●	C13	Upgrades available		
Cromemco C10	£1,350	Z80	4	64K		80x25	M		80x25	W	10	●	2	1		1x390K5/4F	CP/M	Ba	●	C18	Low cost CP/M machine		
C/WP Cortex	£2,179	Z80		64K		80x25	M		600x240	W	10	●	1	1		2x360K5/4F	CP/M	Ba	●	C20	Z80 plus 6502		
DAI PC	£684	8080	2	48K		60x24	Tv(M+)	●	255x335	W	1						Cassette	Ba	●	D9	Optional maths chip		
Datasc Micro Controller	£431	Z80	2	16K		40x24	Tv(M+)		80x60	W	1		1	1	●			Ba	●	D1	Mainly used in labs		
DEC Rainbow 100	£2,714	8088	N/A	64K	192K	132x24	M	●	960x240	W	20	●	2		3	2x400K5/4F	CP/M		●	D2	Versatile business machine		
DEC PC 325	£3,080	PDP11/23	N/A	256K		132x24	M	●	960x240	W	20	●	2		1	2x400K5/4F	P/O/S		●	D2	Mini in micro clothing		
Decision-1 Computer MDC-011	£2,869	Z80A	4	64K	192K		(M+)*						3	1	1	2x400K5/4F	CP/M	Ba	●	I2	*Buy your own terminal		
Diablo 3000	£7,250	8085	3	32K	64K	80x24	M			W	8	●	1		4	2x1.8Mb8F	DACL	Ba	●	B5	Unusual O/S		
Digico Prince	£3,392	Z80A	4	64K		80x25	M			W	50	●	2		7	2x400K5/4F	CP/M		●	D3	Unusual keyboard		
Digital Microsystems DMS-3	£3,576	Z80A	4	64K			(M+)*						3		1	2x512K8F	CP/M		●	D4	*Choice of terminal		
Digital Microsystems DMS-4	£6,210	Z80A	4	128K	1/2Mb		(M+)*						4			2x512K8F	MP/M		●	D4	*Depends on terminal chosen		
Direct 1000	£3,093	Z80	4	64K		80x25	M		132x28	W	2					2x300K5/4F	CP/M		●	D5	Standard CP/M machine		
DMS Fox	£2,875	Z80A	4	64K		80x24	M			W	16	●	3	1	1	1.2Mb5/4F	CP/M		●	D4	Portable machine		
Dragon 32	£174	6809E	1	32K	64K	32x16	Tv(M+)	●	256x192	W	16	●	1	4	1	●	Cassette	Ba	●	D6	Tandy colour lookalike		
Durango F85	£5,744	8085A	5	64K	196K	80x64	Tv(M+)			W	●	4		1	12	2x1Mb5/4F	Star Basic	BaCo	●	C3	Built in printer		
Eagle II	£2,702	Z80A	4	64K		80x24	M		80x24	W	●	2	1	1		2x500K5/4F	CP/M	Ba	●	M3	Upgrades available		
Eagle 1600	£6,497	8086	8	128K	512K	80x25	M	●	720x352	W	24	●	2	1	1	8	1x1Mb5/4F+1x12.5Mb5/4H	MS-DOS, CP/M 86		●	M3	High speed IBM copy	
Electron	£199	6502	2	32K		80x32	Tv(M+)	●	640x256	W	10					●	MOS	BaAs	●	A1	Excellent beginners' machine		
Enterprise 1000	£2,645	*	8	64K						W	10	●	2		2	2x358K5/4F	Enterprise		●	D7	Micro Nova 16-bit		
Epson HX20	£472	6301	1	16K	32K	20x4	LCD		120x32	W	13	●	2		2	●	Cassette	Ba	●	E2	Powerful portable		
Epson QX10	£1,995	Z80	4	192K	256K	80x25	M		640x400	W	18	●	1	1	5	2x320K5/4F	CP/M	Ba	●	E2	Expansion required for Valdocs		
Equator	£6,842	Z80A	4	64K	448K	80x24	M		255x560	W	14	●	7	1	1	8	1x5Mb5/4F+1x750K5/4F	CP/M, MP/M, Turbo DOS		●	E3	Two bigger models available	
Facit 6520	£2,645	Z80	4	64K	128K	80x24	M		80x24	W	8	●	2			2x320K5/4F	CP/M, Facit DOS	Ba	●	F1	Concurrent printing		
Fortune 32-16 System 2	£5,204	68000	6	256K	1Mb	80x24	M	●	1024x1024	W	16	●	1		20	2x800K5/4F	Unix		●	I3	Genuine 16-bit		
Franklin Ace 1000	£914	6502	1	64K	128K	40x24	M, Tv	●	256x192	W	●	1	4	1	●	2x140K5/4F	opt CP/M	Ba	●	C15	Apple IIe compatible		
Fujitsu FM8	£1,150	6809	1	64K		80x25	(M+)	●	640x200	W	10	●	1	4	1	●	Flex	Ba	●	S2	Good for business graphics		
Future Computers FX-20	£2,156	8088	8	128K	1Mb	80x25	M		800x400	W	20	●	2	2		2x800K5/4F	CP/M 86, MS-DOS		●	E1	Business micro, runs CP/M		
Genie II	£299	Z80	1.7	16K	48K	64x16	Tv(M+)		128x48	W	4	●			1	●	Cassette	Ba	●	L2	Speeded-up Genie I		
Genie III	£1,897	Z80A	3.2	64K		80x24	M		160x72	W	8	●	1	1	1	3	2x700K5/4F	New DOS	Ba	●	L2	CP/M costs extra	
Colour Genie	£168	Z80	2.2	32K		40x24	Tv(M+)	●	160x96	W	8	●	1	1	2	1	●	Cassette	Ba	●	L2	Home games machine	
Gemini Galaxy 2	£1,719	Z80	4	64K	512K	80x25	M		160x75	W	10	●	1	1	1	5	●	2x400K5/4F	CP/M		●	G1	Low cost British system
Globe 101	£1,850	8085	3	64K		80x24	M			W	20	●	3			2x325K5/4F	CP/M		●	G4	Worstar plus Mail Merge inc.		
Grundy 8200	£1,850	Z80	4	64K	256K	80x24	M		160x70	W	10	●	1	1		2x390K5/4F	CP/M		●	C19	Software included		
Haywood 9000 Composite	£2,064	Z80A	4	64K	192K	80x25	M		64x255	W	34	●	2		8	2x320K5/4F	CP/M	As	●	H1	Designed for network		
HP 75C	£883	Cust.	N/A	16K	24K	32x1	(M+)			C				1	4	●	1.3K card reader	HP	Ba	●	H2	Calculator/computer	
HP 85	£2,360	Cust.	N/A	16K	32K	32x20	M		255x191	W	8	●	1	4	4	●	Cassette	Ba	●	H2	Engineers' machine		
HP 86A	£1,570	Cust.	N/A	64K	512K	80x24	M		544x240	W			1	1	2	4		HP	Ba	●	H2	CP/M optional	
HP 87XM	£2,571	Cust.	N/A	128K	640K	80x24	M		544x240	W	14	●	1	1	1	3	4		HP DOS	Ba	●	H2	Special technical uses
HP Series 100, 120	£2,362	Z80A	3.88	64K		80x24	M		80x24	W	8	●	2		1			CP/M	Ba	●	H2	Top end HP business system	
HP Series 200 Model 16A	£3,212	68000	8	128K	750K	80x25	M			W	5	●	1	1	2			HP		●	H2	Genuine 16-bit	
Husky Hunter	£997	NSC8000	4	80K	208K	40x8	LCD		240x64	C	8	●	1					CP/M	Ba	●	D10	Waterproof, with metal case	
Hyperion	£3,100	8088	4.7	256K		80x25	M		320x200	W	10	●	1	1	1		1x320K5/4F	MS, DOS, CP/M 86	BaAs	●	G5	Same as Ajile	
Hytech H4500	£4,310	Z80	4	64K	208K	80x25	M		80x25	W	26	●	1		3	2x403K5/4F	CP/M	Ba	●	H3	Standard CP/M micro		
IBM PC	£2,392	8088	4.7	64K	576K	80x25	(M+)	●	640x200	W	10	●	1		5	1x360K5/4F	MS-DOS	Ba	●	I9	Slow but reliable		
IBM PCXT	£4,258	8088	4.77	128K	640K	80x25	(M+)	●	350x720	W	12	●			8	1x10Mb5/4H	DOS 2	Ba	●	I9	8087 co-processor possible		

Make and model

Price inc VAT

Processor type

Speed in MHz

Standard RAM

Max RAM — normally at extra cost

Max characters columns x lines

Method (at extra cost)

Colour capability

Max dot resolution

Type of keyboard

No. of function keys

Numeric pad

No. of RS232

No. of Centronics

No. of IEEE 488

No. of others

No. of expansion slots

Cassette facility

Capacity per disk and disk size

Operating system

Languages inc

Other languages available

Distributor

Comments

HARDWARE

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM — normally at extra cost	Max characters columns x lines	Method (at extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others	No. of expansion slots	Cassette facility	Capacity per disk and disk size	Operating system	Languages inc	Other languages available	Distributor	Comments	
ICL PC Model 10	£2,754	8085	3	64K	256K	80x24	Tv(M+)			W	11	●	2						2x700K5¼F	CP/M	Ba	●	I4	Bottom of range	
ICL PC Model 15	£2,702	8085A	5	64K	512K	80x25	M			W	●	●	8						1x13.3Mb5¼H	CP/M, MP/M	Ba	●	I4	Suitable for small business	
IDS Datamachine	£1,995	Z80	4	64K	1Mb	*	Tv(M+)	*	*				2				15		2x400K5¼F	CP/M	Ba	●	I8	*Depends on terminal	
IO Tech Iona	£2,539	Z80	4	69K	960K	80x24	M	●	160x75	W	12	●	1	1				8	●	2x400K5¼F	CP/M		●	I5	Good colour versatility
Intellicon + micro adaptor	£189.90	CP1610	2.4	5K		20x12	Tv	●	160x96	C										Cassette	Ba		M7	Computer adaptor is £89.95	
ITT 3030	£3,105	Z80A	4	64K	256K	80x24	Tv(M+)		80x24	W	8	●	1						2x280K5¼F	CP/M, BOS			●	I7	Top end business system
Jupiter Ace	£90	Z80	3.25	3K	51K	32x24	Tv(M+)		64x46	C											Fr		J1	Native Forth machine	
Kalamazoo 1050	£3,450	8085	6	64K		80x24	Tv(M+)		80x24	W	10		1						2x250K5¼F	Kalamazoo			●	K3	Only Kabol language
Kaypro II	£1,949	Z80	4	64K		80x24	M			W	●	●	1	1					2x200K5¼F	CP/M	Ba	●	C15	PCN issue 35	
Kaypro 10	£3,340	Z80A	4	64K		80x24	M		100x160	W	●	●	1						1x10Mb5¼H	CP/M	Ba	●	C15	PCN issue 35	
Kemitron K2000E	£2,242	Z80	4	64K		80x24	(M+)		80x24	W	2	1							1x300K5¼F	CP/M			●	K4	Scientific Keyboard
Kemitron K3000	£3,795	Z80	4	64K	256K	80x24	(M+)		80x24	W	●	2							2x1Mb8F	CP/M, MP/M			●	K4	For scientific use
Kenilworth 83G	£1,953	Z80A	4	64K		80x25	TvM		160x75	W	10	●	1	1					2x350K5¼F	CP/M			●	K5	British portable
Kontron RSI 80	£3,306	Z80	4	64K	128K	80x25	M		256x512	W	16	●	2	1					2x303K5¼F	Kontron	Ba	●	K6	O/S CP/M based	
Krypton 800 range	£1,949	Z80A	4	64K	256K	80x24	M		80x24	W	13	●	2	1					2x386K5¼F	CP/M			●	T8	Fully definable characters
Laser 200	£70	Z80A	3.6	4K	64K	32x16	TV	●	32x16	C			1								Ba		C14	Cheap colour computer	
LSI M3	£2,064	Z80	2.5	64K		80x24	M		80x24	W	31	●	1	1					2x200K5¼F	CP/M			●	L3	Big, British and CP/M
LSI M4	£2,472	8088	5	128K	256K	80x24	M		160x72	W	31	●	2	1					2x400K5¼F	CP/M 86, CP/M80			●	L3	Z80 for 8-bit software
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80x24	M	●	640x288	W	12	●	1	1					2x1Mb5¼F	CP/M, MS-DOS	Ba	●	L4	High-res colour graphics	
Magnum	£1,489	Z80	4	64K		80x25	M			W	●	2							2x400K5¼F	CP/M			●	I6	Inexpensive CP/M machine
Marin Chip M9900	£5,750	9900	3	64K	1.6Mb	24x80	M		24x80	W	8	●	4						2x1.2Mb8F	MOS, MDEX	Ba	●	M2	Genuine 16-bit	
Merlin M2215	£2,742	8085	5	64K		24x80	M			W	22	●	2						2x780K5¼F	CP/M	Ba	●	B7	Business computer	
Micro Five 1000	£5,175	8088	8	128K	512K	25x80	TvM		512x512	W	20	●	10						2x1Mb5¼F+2x6.3Mb5¼H	*			●	F2	*Choose your own O/S
Micro Five 3000	£10,350	8086	5	128K	1Mb	25x80	TvM		512x512	W	20	●	5						1x10Mb8F	*			●	F2	*Choose your own O/S
Microdecision	£1,144	Z80	4	64K		80x24	(M+)			W	●	2							1x200K5¼F	CP/M	Ba, Pilot		●	M9	*Terminal extra
Microsolution British Genius	£1,840	Z80	4	64K		80x24	TvM		80x24	W	21	●	1	1					2x160K5¼F	CP/M			●	M4	'Genius' by nature?
Microtan 65	£389	6502	1	8K	48K	25x64	(TvM+)			W	●	1	2							Tanbug	Ba	●	M8	PCN issue 26	
Millbank SX10	£2,754	Z80A	4	65K	256K	80x25	M		80x25	W	10	●	2						2x350K5¼F	CP/M	As		●	M5	Scientific applications
Minstrel	£2,059	Z80	4	64K	352K														2x400K5¼F	CP/M opt			●	H4	Choose your terminal
Molecular M200	£5,462	Z80	4	64K	320K		(M+)*			*			2						1x10Mb8H+1x500K8F	CP/M	BaAs		●	G2	*Terminal required
Monroe EC8800	£2,990	Z80A	3	128K		40x24	M		240x240	W	32	●	3						1x320K5¼F	Monroe	BaPaPilot		●	F3	Only 40-character screen
Monroe OC8810	£3,162	Z80A	3	128K		80x24	M		80x24	W	32	●	3						1x320K5¼F	Monroe	BaPa		●	F3	Bigger model available
Mupid 320-GB	£978	Z80A	4	64K	128K	40x24	Tv(M+)	●	320x240	W	55	●								CP/M+	BaAs		●	P6	PCN issue 22
Nascom 2/3	£327	Z80A	4	2K	64K	16x48	Tv(M+)		48x96	W			1							NAS, SYS	BaAs		●	L5	Old reliable
NCR Decision Mate V	£1,983	Z80A	4	64K	512K	24x80	M	●	640x400	W	20	●							2x320K5¼F	CP/M 80	As		●	N3	PCN issue 8
NEC PC8000	£1,454	Z80	4	32K	64K	80x25	M	●	160x100	W	10	●	2	1					2x300K5¼F	CP/M, NEC, DOS	Ba	●	N1	Superb colour graphics	
NEC PC8001	£1,375	Z80A	4	64K		80x24	M	●	100x200	W	10	●	1						2x144K5¼F	CP/M	Ba		●	N1	Price includes twin disk drive
New Brain A	£269	Z80A	4	32K	512K	80x30	Tv(M+)		640x220	C	2									Cassette	Ba		G3	A lot of promise	
North Star Advantage	£2,766	Z80	4	64K		80x24	M		640x240	W	15		1						2x360K5¼F	CP/M			●	T9	16-bit option
North Star Horizon	£2,294	Z80	4	64K	512K	*	*		*	*			2	1					2x360K5¼F	North Star DOS	Ba	●	T9	*Choose your own terminal	
OEM Orion	£3,392	8086	8	128K	896K	80x25	TvM		800x400	W	13	●	11						2x500K5¼F	CP/M 86	BaCo		●	O5	*Full communications machine
Olivetti M20	£2,869	Z8000	3	160K	512K	80x25	M	●	512x256	W	●	1	1						2x320K5¼F	PCOS	Ba		●	B6	Real 16-bitter
Olympia Boss Model A	£2,645	Z80A	4	64K		80x28	M	●	80x28	W	10	●	1						2x140K5¼F	CP/M			●	O1	Useful 28 lines on screen
Onyx 5001 MU	£7,607	Z80A	4	128K	256K	*	*		*	*			5	1					1x7Mb5¼H	CP/M	Ba	●	T2	*Terminal extra; other models	
Oric 1	£80	6502A	1	16K	48K	40x28	Tv(M+)	●	240x200	C										Cassette	Ba		●	O2	4-colour printer opt

Osborne 1	£1,581	Z80	4	64K		104x24	M		104x24	W	10	●	1	1			2x185K5¼F	CP/M	Ba	●	O3	Portable, includes software	
Panasonic JD 800M	£3,795	8085A	4	60K		80x24	M		80x24	W	21	●	3				2x250K8F	CP/M	Ba	●	P1	Larger model costs £5,002	
Pasca 640	£1,437	Z80A	4	64K		80x24	M			W	●	1	1				2x250K8F	CP/M		●	W1	Regular CP/M micro	
Pascal Modular Microengine	£7,003	WD9000	2	128K			*			*							2x1.2Mb8F	UCSD-P	Pa	●	P2	*Terminal extra	
Pied Piper	£1,226	Z80A	4	64K		80x24	Tv(M+)			W	36		1	1			1x780K5¼F	CP/M			S11	PCN issue 4	
Philips P3500	£3,000	Z80A	4	64K	320K	80x25	M			W	11	●	2				2x0.6Mb5¼F	Turbo-DOS	Co	●	P3	Fast O/S as standard	
Portico Miracle Portable	£2,064	Z80A	4	128K	256K	80x25	M		640x250	W	10	●	2	1	5		2x400K5¼F	CP/M		●	P7	PCN issue 28	
Positron 900	£1,259	6809	1	64K	256K		(M+)			*			4	1	3			O/S 9	Ba	●	P4	*You choose your terminal	
Positron 900	£2,134	6809	1	64K	256K	80x24	TvM	●	480x240	W	12	●	4	1	3			O/S 9	Ba	●	P4	Multi-user version	
Powertran Cortex	£454	9995	12	64K	1Mb	40x24	Tv(M+)	●	256x192	W	12	●	1						BaAs		M2	Mainly sold as £340 kit	
Quantum 2000	£2,587	Z80A	4	64K	192K	80x25	M		160x75	W	18	●	1	1	5	●	3x860K5¼F	CP/M		●	Q1	Monu, low-res graphics	
Rair Black Box Model 3/20S	£2,242	8085	5	64K	256K	80x24	(M+)			*			2		8		2x1Mb5¼F	CP/M	Ba	●	R1	*VDU extra; many versions	
Rair Business Computer	£6,037	8088	5	256K	1Mb	80x25	M	●		W	10	●	2		4	8	1x19Mb5¼H+1x1Mb5¼F	CP/M, PCDOS	Ba	●	R1	Hybrid 8/16 bit	
Racal 6000	£6,327	Z80	5	64K	256K	80x26	M		80x26	W	21	●	1	1			1x600K8F	CP/M		●	R2	CP/M languages available	
Research Machines 380Z	£2,147	Z80A	4	32K	56K	40x24	Tv(M+)			W			1	1	4	●	2x144K5¼F	CP/M	Ba	●	R3	Widely used in schools	
Research Machines Link 480Z	£650	Z80A	4	32K	256K	40x24	Tv(M+)			W	4		2	1	1	2	●		Cassette	Ba	●	R3	CP/Net version available
Sage II	£4,019	68000	8	128K	512K		(M+)			*			2	1	1		2x640K5¼F	UCSD-P System	BaAsPaFn	●	T10	*Terminal extra	
Sage IV	£5,962	68000	8	128K	1Mb		(M+)	●		*			6	1	1		2x640K5F+1x6MbH5¼	UCSD-P System	PaBaFn	●	T10	*Terminal own choice	
Samurai	£2,754	8086	4.6	128K	768K	80x25	M	●	720x400	W	12	●	3	1	3		2x1.2Mb8F	MS DOS, CP/M 86		●	M6	High-res colour graphics	
Sanyo MBC 1000	£1,195	Z80A	4	64K		80x25	M	●	80x25	W	17	●	1	1			1x320K5¼F	CP/M	Ba	●	L1	Standard CP/M model	
Sanyo MBC 1250	£2,294	Z80	4	64K		80x40	M		640x400	W			1	1			2x640K5¼F	CP/M	Ba	●	L1	High-res graphics	
Sanyo MBC 2000	£2,242	8085A	5	64K		80x24	M		80x24	W	24	●	2	1	2		2x328K5¼F	CP/M	Ba	●	L1	Big disk model costs £3,622	
Sanyo MBC 4050	£2,817	8086	5	128K	512K	80x24	M		80x24	W			1	1			2x640K5¼F	CP/M 86	Ba	●	L1	Pseudo 16-bit	
Seed System 1	£2,300	6800	2	32K	64K	80x24	M		80x24	W	3	●	2		8		2x160K5¼F	DOS 68 Flex	Ba	●	S3	Ageing business machine	
Seed System 19	£2,600	6809	2	48K	1Mb	80x24	M			W	3	●	2		8		2x160K5¼F	OS-9		●	S3	Latest from Seed	
Sharp MZ80A	£347	Z80	2	48K		40x25	M		80x50	W										Ba	●	S4	CP/M facility extra
Sharp MZ80B	£900	Z80A	4	64K		80x25	M		320x200	C	10	●								Ba	●	S4	Unusual keyboard
Sharp MZ700	£250	Z80A	4	64K	68K	40x25	Tv(M+)	●	80x50	W	5		1	2	1					Ba	●	S4	PCN issue 27
Sharp PC1251	£79.95	Cust.	.58	4.2K			LCD		24x1	C	18	●								Ba	●	S4	Pocket computer
Sharp PC1500	£169	Cust.	1.3	3.5K	11.5K	26x1	LCD		156x7	C	6	●	1	1	2	●				Ba	●	S4	Optional 4-pen plotter
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	80x25	M		160x50	W	10	●			5		2x500K5¼F		Sharp Basic	Ba	●	S4	Powerful Sharp Basic
Signal 10025	£1,599	Z80B	6	64K		80x24	M	●	512x512	W			2	1	1		2x200K5¼F	CP/M, Macnos		●	S9	Choice of keyboards	
Signal 2	£1,483	Z80	4	64K		80x24	(M+)		512x256	W	18	●	2				2x200K5¼F	CP/M			S9	Multi-user system	
Sinclair ZX81	£40	Z80A		16K	16K	32x24	Tv		64x44	C										Ba	●	S5	Sold a million
Sinclair Spectrum	£99	Z80A	3.5	16K	48K	32x24	Tv	●	256x192	C										Ba	●	S5	PCN issue 14
Sirius I	£2,525	8088	5	128K	896K	80x25	M		800x400	W	7	●	2	1	4		2x600K5¼F	CP/M 86, MS/DOS	Ba	●	A7	IBM style	
Sord M5	£150	Z80A	4	4K	16K	40x24	Tv(M+)	●	256x196	C				1	2	●				Ba	●	S6	PCN issue 12
Sord M32	£1,932	Z80A	4	128K		80x25	M	●		W	14	●	2	1	2	3		2x330K5¼F	Sord O/S, SB80	BaPips	●	S6	CP/M compatible
Sord M23P	£2,369	Z80A	4	128K		80x25	Tv(M+)	●	640x200	W	14	●	2	1	2	2		2x290K3½F	Sord O/S, SB80	BaPips	●	S6	Complete with suitcase
Sord M223	£3,277	Z80	4	64K		80x25	M			W	●		2		4		2x350K5¼F	Sord O/S, SB80	BaPips	●	S6	Standard business machine	
Sord M243	£5,842	Z80	4	192K		80x25	M	●	640x400	W	15	●	4	1	4		2x1Mb8F	Sord O/S, SB80	BaPips	●	S6	Large and powerful	
SWTP SO9	£5,750	6809	2	256K	1.2Mb	80x24	M			W	15	●	1	1			2x1.5Mb5¼F	Flex, Uniflex		●	S7	Top end SWTP	
Spectrum	£11,442	68000	8	256K	4Mb		(M+)			*			4		16		2x720K5¼F	Mirage	Ap	●	M1	*As terminal	
Sundance I	£6,969	Z80A	4	64K	256K	132x24	M			W	4	●	1	1		●	1x7Mb5¼H	CP/M	Ba	●	T2	Ordinary CP/M machine	
Sundance II	£8,205	Z80A	4	128K	256K	132x24	M			W	4	●	1	1		●	1x7Mb5¼H	CP/M	Ba	●	T2	Middle-range Sundance	
Sundance 16	£10,480	Z8001	6	256K	1Mb	80x24	M			W	●		5	1		●	1x14Mb5¼H	BOS		●	T2	Tape backup for hard disk	
Superbrain JR	£2,127	Z80A	4	64K		80x24	M		560x240	W	●		2		1		2x160K5¼F	CP/M	Ba	●	I10	Bigger models available	
Superstar	£6,296	Z80	4	64K		80x24	Tv(M+)		80x24	W			1	1	8		1x10Mb5¼H+1x400K5¼F	CP/M 80	Ba	●	B7	Includes hard disk	
Tandberg EC10	£3,000	8080A	2	64K		80x25	M			W	●		7				1x250K8F	CP/M, TOS	Ba	●	T3	Very early machine	
Tandy TRS-80 Model II	£1,999	Z80A	4	64K	256K	80x24	M		80x24	W	2	●	2	1			1x500K8F	TRS-DOS	Ba	●	T4	Big business machine	
Tandy TRS-80 Model III	£1,299	Z80A	2	48K		64x16	M		128x48	W	●		1	1	1	●	2x184K5¼F	TRS-DOS	Ba	●	T4	Standard TRS 80	
Tandy TRS-80 Model 16	£4,199	68000	8	128K	512K	80x24	M			W	2	●	2	1			2x1.2Mb8F	TRS-DOS	BaAs	●	T4	True 16-bit	
Tandy TRS-80 Colour Computer	£180	6809E	1	16K	32K	32x16	Tv	●	256x192	W										Ba	●	T4	Related to Dragon 32
Tandy TRS-80 PC4	£50	Cust.	N/A	½K	1½K	12x1	LCD		12x1	C	9	●			1	1				Ba	●	T4	Low-cost pocket computer
Tandy Model 4	£861	Z80A	2	16K	128K	80x24	M		80x24	W	10	●	1	1		●	1x187K5¼F	TRS DOS	Ba	●	T4	Floppies versions available	

Vic-20 tape recorder, 16k RAM pack, super expander, motherboard, joystick, games, books, etc, still under makers guarantee, worth £280, sell £180. Tel: Clevedon 875258 (Peterson).

Texas TI199-4A, includes speech synthesiser, joystick, mini-memory, extended Basic, Munchkin, Invaders, Parsec, Frogger and other games, £250 ono. Tel: 0647 73392, Stephen Godfrey.

Texas TI994A, RS232 interface card, two RS232 interfaces and one centronics interface, requires pherical expansion box, £50. Tel: 064733392.

Osborne Portable, CPM, Wordstar, VisiCalc, used for approx 8 hours, still under guarantee, half price £695. Tel: 01-748 6288.

Lynx 48K, boxed, manual, demonstration cassette, leads, newsletters, £160, apply in writing please. Paul Davey, 13 Sudeley St, Brighton.

Newbrain Model A, complete, all leads, some software games and database, £175 ono; also Zenith 12in green monitor, £60. Tel: Hemel Hempstead 0442833821 eves/weekends.

Onko Scientific C2-8P, 48k RAM, 2 x 8in disks, 500k, Basic + OS-65U, Televideo 920 VDU with many facilities, £700 ono, may sell separately. Tel: Northwich (0606) 74767.

Atari 400 + 410 recorder, Basic Pro-joystick, technical reference notes, manuals, user mags, and games, as new; +ZX81, + manuals, £149. Tel: 01-427 6096.

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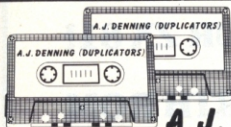
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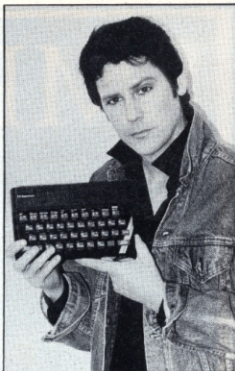
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CBS behind the green door Acorn calling

RAMpack wobble fans will be pleased to hear of the appearance of 'The Shaky Game', which is not only given away free with cassettes of the Bop Won't Stop by Shakin' Stevens.

The game runs on the 48K Spectrum, although the album itself will only work on standard hi-fi equipment. Your goal is to drive Mr Stevens to his 'ole house' — fans will notice the allusion to this seminal Stevens work — while avoiding 'clusters of lethal vampire bats.'

CBS reliably informs us that this is the first time a pop star, shaking or otherwise, has been crammed inside a 48K Spectrum.



All shook up on a Spectrum.

Supporters of Acorn's campaign to free women from drudgery and stick them behind micro keyboards instead will be gratified by the latest developments. At Compec, besides showing off the cocktails program — so handy for those long afternoons by the tumble dryer — Acorn had implemented the next stage in its neo-liberationist campaign.

The current stage in the battle to interest 'the gels' in micros seems to involve plastering them up in green and white Acorn jumpsuits, and paying them to dish out leaflets. Funny thing, liberation.

SLANTAX ERRORS

Tempting bug

In our review of *Baron* from temptation Software (Issue 36) we stated there was a bug in a 'Yes/No' answer routine. However, Temptation tells us that this is in fact a feature of the program's error trapping.

NEXT WEEK

Hardware *Is the Dragon 64 twice as nice?*

Awards *Nominate your favourite system, peripheral or program in the 1984 British Micro Awards*

Buyer's Guide *A 16-page special to guide you through the hardware maze.*

Win a rifle Games *Ten Stack rifles and games are the prizes. An Oric round-up plus reviews of games on the Spectrum, BBC and Atari.*

PAL2000

by Mollusc.



PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

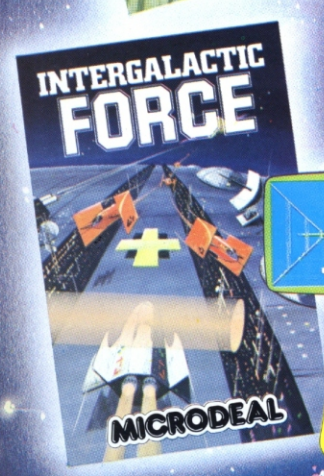
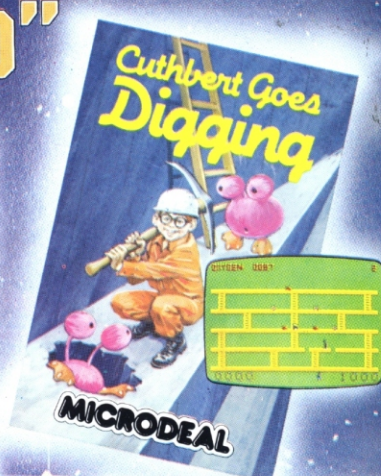
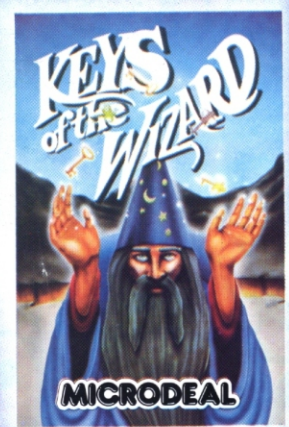
Event	Dates	Venue	Organisers
Northern Computer Fair	November 24-26	Belle Vue, Manchester	Reed Exhibitions, 01-643 8040
BBC Micro User Show	December 9-11	Westminster Exhibition Centre	Database Publications, 061-456-8383
Your Computer Christmas Fair	December 15-18	Wembley Conference Centre	Reed Exhibitions, 01-643 8040
Which Computer? Show	January 17-20	NEC, Birmingham	Clapp & Poliak Europe Ltd., 01-747 3131
Northern Home Entertainment Show	January 19-22	Excelsior Hotel, Manchester Airport	Stanley Wire Advertising Ltd., 01-253 6637
Acorn Education Exhibition	January 25-27	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd, 01-930 1612
Communications & Computer Systems Fair — CABLES	February 2-4	Pontin's, Prestatyn, Wales	Pontin's Ltd., 07456 2267
LET '84	February 13-15	Heathrow Penta Hotel	Anthony Farrar, 0923 774262
International Home Computers, Video Games & Software Exhibition	February 13-15	Heathrow Penta	Wheatland Journals Ltd., 0923 774262
Information Technology & Office Automation Exhibition and Conference	February 21-24	Barbican Centre, London EC1	B.E.D. Exhibitions Ltd., 01-647 1001
OEM Only Conference	March 7	Hilton Hotel, London W1	Tom Lewis, 01-994 6477
Computer Trade Show	March 13-15	Wembley Conference Centre, Middlesex	Reed Exhibitions, 01-643 8040
Essex Apple Village	March 25-28	Festival Hall, Basildon, Essex	Database Publications, 061-456 8383

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Computer Indonesia	Nov 22-25	Jakarta	Overseas Exhibition Services Ltd., 01-486 1951
Computer Dealers Exhibition	November 28-Dec 2	Las Vegas, USA	Interface Group Conference & Exposition Management, 160 Speen St., Framingham, MA 01701, USA
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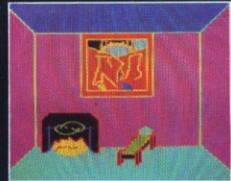
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